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SYNTHESIS 373

NATIONAL
COOPERATIVE
HIGHWAY
RESEARCH
PROGRAM

Multi-Disciplinary Teams in Context-Sensitive Solutions



A Synthesis of Highway Practice

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Multi-Disciplinary Teams in Context-Sensitive Solutions

A Synthesis of Highway Practice

CONSULTANT

LEIGH BLACKMON LANE
Center for Transportation and the Environment
North Carolina State University
Raleigh, North Carolina

SUBJECT AREAS

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NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

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FOREWORD

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Highway administrators, engineers, and researchers often face problems for which information already exists, either in documented form or as undocumented experience and practice. This information may be fragmented, scattered, and unevaluated. As a consequence, full knowledge of what has been learned about a problem may not be brought to bear on its solution. Costly research findings may go unused, valuable experience may be overlooked, and due consideration may not be given to recommended practices for solving or alleviating the problem.

There is information on nearly every subject of concern to highway administrators and engineers. Much of it derives from research or from the work of practitioners faced with problems in their day-to-day work. To provide a systematic means for assembling and evaluating such useful information and to make it available to the entire highway community, the American Association of State Highway and Transportation Officials—through the mechanism of the National Cooperative Highway Research Program—authorized the Transportation Research Board to undertake a continuing study. This study, NCHRP Project 20-5, “Synthesis of Information Related to Highway Problems,” searches out and synthesizes useful knowledge from all available sources and prepares concise, documented reports on specific topics. Reports from this endeavor constitute an NCHRP report series, *Synthesis of Highway Practice*.

This synthesis series reports on current knowledge and practice, in a compact format, without the detailed directions usually found in handbooks or design manuals. Each report in the series provides a compendium of the best knowledge available on those measures found to be the most successful in resolving specific problems.

PREFACE

This synthesis will be of interest to state department of transportation (DOT) personnel, as well as to others in community and environmental stakeholder groups who work with them in the area of context-sensitive solutions (CSS). The underlying theme is one of developing transportation solutions that improve the quality of life for the communities being served by transportation agencies. The philosophy has continued to evolve over the last 10 years. However, the inclusion of multiple perspectives and disciplines in the decision-making process remains a fundamental principle in defining CSS. All survey responses revealed that most state DOTs are using multi-disciplinary teams in some form. Guidelines are provided from these examples to point out areas where practices can be revised to make multi-disciplinary teams an even more effective part of achieving CSS. Results from this synthesis show that states value multi-disciplinary teams and such tangible benefits as reduced costs and quicker project delivery.

This TRB synthesis contains information gathered from 32 states, supplemented by material collected as part of a literature review process. Four case studies showcase three projects and one programmatic approach that used multi-disciplinary teams representing a wide range of stakeholders. These case studies provide valuable lessons learned through notable practices that can be transferred to project development processes of the other state DOTs.

Leigh Blackmon Lane, Center for Transportation and the Environment, North Carolina State University, Raleigh, North Carolina, collected and synthesized the information and wrote the report. The members of the topic panel are acknowledged on the preceding page. This synthesis is an immediately useful document that records the practices that were acceptable within the limitations of the knowledge available at the time of its preparation. As progress in research and practice continues, new knowledge will be added to that now at hand.

CONTENTS

1	SUMMARY
5	CHAPTER ONE INTRODUCTION Background, 5 Synthesis Objective, 7 Synthesis Organization, 7
8	CHAPTER TWO CONTEXT-SENSITIVE SOLUTIONS AND MULTI-DISCIPLINARY TEAMS: CURRENT PRACTICE Literature Review, 8 Department of Transportation Policies and Programs, 9 National Survey, 11
22	CHAPTER THREE CASE STUDIES Case Study Criteria and Development, 22 I-580 Freeway Extension Project, Reno to Carson City, Nevada, 22 MD-45/York Road Streetscape, North Baltimore Area, Maryland, 26 SR-12 Escalante to Boulder, Utah, 30 Efficient Transportation Decision-Making Program, Florida, 35 Summary of Lessons Learned, 40
42	CHAPTER FOUR CONCLUSIONS
46	ACRONYMS
47	REFERENCES
48	BIBLIOGRAPHY
50	APPENDIX A PEER EXCHANGE INFORMATION ON MULTI-DISCIPLINARY TEAMS
51	APPENDIX B SURVEY INSTRUMENT AND ACCOMPANYING MATERIALS
59	APPENDIX C TABULATED SURVEY RESULTS

MULTI-DISCIPLINARY TEAMS IN CONTEXT-SENSITIVE SOLUTIONS

SUMMARY

Context-sensitive solutions (CSS) has become a commonly used term to describe processes and outcomes that embrace holistic approaches to transportation decision making by meeting transportation needs in a way that is compatible with the human and natural environment as well as adding lasting value to communities. The CSS philosophy embraces an inclusive and collaborative decision-making approach by bringing together a diverse group of stakeholders with varying interests and needs to collectively develop a solution to a transportation need. Consequently, multiple disciplines working together as a team have been recognized by transportation professionals as a fundamental process element to achieve a solution that is context-sensitive. The CSS approach to transportation decision making suggests that multi-disciplinary teams:

- Fully represent the natural and human context as well as the community's perspective of a good quality of life.
- Have a set of ground rules by which they operate to ensure inclusiveness of ideas.
- Have a transparent, systematic process in place that allows team members to review how their input is being used to make project decisions. This includes the presence of sincere feedback loops.
- Promote an atmosphere of collaboration that strives toward consensus.
- Exemplify a sense of trust among team members.
- Have ownership of the outcome.
- Use good information-sharing practices.

The purpose of this synthesis is to document the current practice of state departments of transportation (DOTs) using multi-disciplinary teams to develop CSS and suggest notable practices as well as areas for future study. The information presented in this synthesis is based on responses received from a nationwide survey, supplemented by a review of available literature, including the examination of all state DOT websites for information on CSS policies and programs. The survey was submitted to all 50 states, with 32 state DOTs (64%) responding. In addition, four case studies are presented to showcase three projects and one programmatic approach that used multi-disciplinary teams to attain solutions that were sensitive to their context. A summary of suggested practices and future study topics that can advance the current practice of utilizing multi-disciplinary teams for CSS is provided here by topic area.

- Composition of Multi-Disciplinary Teams

Nineteen of the state DOTs surveyed reported having a CSS policy, and many mentioned the importance of utilizing multi-disciplinary teams for CSS. However, only a few specified that a core team of professionals should be involved on the teams. The results of this synthesis suggest that the following disciplines be systematically engaged for project development and considered a core team:

- Transportation planners,
- Highway and traffic engineers,

- Environmental and social scientists,
- Land-use planners,
- Cultural resource managers,
- Urban designers and architects,
- Landscape architects and urban foresters,
- Construction and maintenance engineers, and
- Public involvement specialists.

This list should be expanded as needed to reflect the project context and stakeholder interests.

Many states use multi-disciplinary teams comprised of internal stakeholders. Such teams, comprised of DOT staff, are unlikely to capture the full context of a project because they may not include the full range of viewpoints. The staff resources used for the majority of internal team members are usually limited to engineering, along with some planning and environmental disciplines. Therefore, it is unclear if such a team represents all contextual elements or the values placed on those elements by the community.

- Context-Sensitive Solution Training

Although most responding state DOTs believe that their training is representative of a multi-disciplinary team, most individuals being trained work in the area of project development and represent the engineering, planning, and environmental science disciplines. In addition, the group outside of state DOTs most likely to receive training is local government officials and staff. Although this technically does qualify as a multi-disciplinary team, the question remains as to whether it fully represents the natural and human context as well as the community's perspectives. Relatively low numbers of community participants in training programs suggest that state DOTs may want to expand their programs to include more community members.

- Process/Method for Selecting Participants of a Multi-Disciplinary Team

Most state DOTs decide who participates on a multi-disciplinary team based on the context of the project. Although this may appear to be completely logical, the question of how that context is initially defined is of utmost concern when understanding if this is an appropriate method of participant selection. Some states have adopted approaches that use context auditing tools to identify issues early.

- Integrating Public Involvement into Multi-Disciplinary Teams' Decision Making

The role of public involvement and community participation in CSS is widely regarded as one of the most important elements of ensuring a solution that is context-sensitive. Consequently, the role of public involvement within the constructs of a multi-disciplinary team is of critical importance to the project development process and is confirmed by the state DOTs' responses related to using public controversy as a primary trigger when deciding whether or not to use a multi-disciplinary team. This leads to the question of whether state DOTs are fully engaging members of the public in a meaningful way in the project development process. Based on the survey, public comments are the primary means by which community interests and needs are represented on multi-disciplinary teams. Furthermore, the survey results reveal that state DOTs are relying on the methods of open forum meetings, newsletters, and websites for information dissemination and collection of public comments. Although these techniques may be effective in certain communities, such techniques do require that persons be mobile, literate, and have access to the Internet. Therefore, close examination of meaningful public involvement techniques is critical to support the CSS qualities of open, honest, early, and continuous communication.

- Types of Projects That Use Multi-Disciplinary Teams

According to the survey, state DOTs are primarily using multi-disciplinary teams for large- to medium-sized environmental (National Environmental Policy Act) studies and not for smaller projects, and perhaps may not be fully applying the principles of CSS to these projects. No other questions in the survey or literature review information provided any substantive reasoning for the use of multi-disciplinary teams on these larger studies, with the possible exception of the decision trigger question involving public controversy. The deductive logic tying public controversy to larger projects holds that larger projects tend to affect more people and therefore have the potential to attract more controversy. However, the CSS philosophy is applicable to all types and scales of projects.

- Gauging Satisfaction of Team Members

Gauging the satisfaction of multi-disciplinary team members during the project development process is critically important toward improving processes. Unfortunately, many state DOTs did not respond to this question, which may imply that they are not using a performance measurement system. For the state DOTs that did respond, post-project critique/“lessons learned” discussions were the favored method to gauge satisfaction. DOTs that want to improve the effectiveness of multi-disciplinary teams in all of the previously listed dimensions should establish a methodology for evaluating team effectiveness and the satisfaction of team members. In the short term, such evaluations can highlight areas where the procedures of the team should be adjusted, whereas in the long term evaluations can uncover areas where more systemic change is needed.

- Benefits of Multi-Disciplinary Team Usage for CSS

The results of this synthesis show that state DOTs value multi-disciplinary teams. Greater public acceptance, expedited project delivery, and shared funding through partnerships were recognized as positive benefits of multi-disciplinary teams by most of the state DOTs responding to the nationwide survey.

INTRODUCTION

BACKGROUND

Although, the principles of context-sensitive solutions (CSS) were apparent as early as 1970 with the passage of the National Environmental Policy Act (NEPA), tangible evidence of the inclusion of these principles in the development of transportation projects began in the 1990s. In 1991, Congress passed the Intermodal Surface Transportation Efficiency Act (ISTEA). This legislation emphasized that, in addition to being safe, projects should be sensitive to their surrounding environment, especially in scenic or historic areas. Then, in 1995, with the enactment of the National Highway System Code [specifically 23 USC 109(c)], legislation stated that designs should take into account the constructed and natural environment of the area; effects of the project on environmental, scenic, aesthetic, historic, community, and preservation interests; and access for other modes of transportation (1).

A celebrated event of the CSS movement came in 1998 with the release of FHWA's *Flexibility in Highway Design*, a guide developed in partnership with AASHTO, the Bicycle Federation of America, National Trust for Historic Preservation, and Scenic America. This guide states that, "We encourage designers to become partners with transportation specialists, landscape architects, environmental specialists, and others who can bring their unique expertise to the important task of improving transportation decision making and preserving the character of this Nation's communities" (2, p. iii). This is one of the first resources to speak directly to the importance of multi-disciplinary teams in determining the existing character of a corridor to facilitate design choices that reflect community values. It also provides a list of some of the professions that may be part of a multi-disciplinary team, including traffic engineers, ecologists, transportation and urban planners, social scientists, landscape architects, architects, urban designers, historians, biologists, archaeologists, geologists, and artists (2).

In May 1998, following the release of *Flexibility in Highway Design*, Thinking Beyond the Pavement: A National Workshop on Integrating Highway Development with Communities and the Environment was held, which was co-sponsored by the Maryland State Highway Administration (MDSHA), FHWA, and AASHTO. The target audience of this workshop was state departments of transportation (DOTs), and environmental and community stakeholder groups. The goal of the workshop was aptly characterized by Tom Warne, former Executive Director of the Utah DOT:

In the beginning of the Interstate era, we built the greatest free-way system in the world; but aesthetics and preserving the environment weren't part of that mission. Now we need another transformation. We're here to define a new vision, to change how we do business (3).

The participants of this workshop reached a consensus on the qualities of projects and the characteristics of a project development process that would achieve this new vision of integrating transportation solutions with communities and the environment. Listed here are the qualities of excellence in transportation design that came from this workshop:

- The project satisfies the purpose and needs as agreed to by a full range of stakeholders. This agreement is forged in the earliest phase of the project and amended as warranted as the project develops.
- The project is a safe facility both for the user and the community.
- The project is in harmony with the community and preserves environmental, scenic, aesthetic, historic, and natural resource values of the area; that is, exhibits context-sensitive design (CSD).
- The project exceeds the expectations of both designers and stakeholders, and achieves a level of excellence in people's minds.
- The project involves efficient and effective use of resources (time, budget, community) of all involved parties.
- The project is designed and built with minimal disruption to the community.
- The project is seen as having added lasting value to the community.

The workshop participants also generated the characteristics of the process that would yield excellence:

- Communication with all stakeholders is open and honest, early and continuous.
- A multi-disciplinary team is established early, with disciplines based on the needs of the specific project and with the inclusion of the public.
- A full range of stakeholders is involved with transportation officials in the scoping phase. The purposes of the project are clearly defined and consensus on the scope is forged before proceeding.
- The highway development process is tailored to the circumstances. A process is employed that examines

multiple alternatives and that will result in consensus on approaches.

- A commitment to the process from top agency officials and local leaders is secured.
- The public involvement process that will include informal meetings is tailored to the project.
- The landscape, the community, and valued resources are understood before engineering design is begun.
- A full range of tools for communication about the project alternatives is used (e.g., visualization).

Although only one of these qualities and characteristics speaks directly to multi-disciplinary teams, almost all of them support the use of multi-disciplinary teams to obtain the desired outcome and fulfill the intentions of a CSS-based process.

Since 1998, the definition and principles of CSS have continued to evolve in the transportation industry. The CSS philosophy has expanded well beyond the design process to include all phases of project delivery, including long-range planning, construction, and maintenance activities. This expansion is reflected by the change in terminology from context-sensitive design to context-sensitive solutions. The term “solutions” is now used to recognize the holistic range of ideas that may be considered as part of the project delivery process.

It should be noted that state DOTs and other transportation agencies that incorporate the principles of CSS into their processes may use other terms to describe those principles. For example, terms currently in use include Transportation Design for Livable Communities, Community-Sensitive Design, Place-Based/Sensitive Design, Place-Making, Context-Sensitive Sustainable Solutions, and Common Sense Solutions. Regardless of the specific term used, the underlying message behind the CSS philosophy is one of developing transportation solutions that improve the quality of life for the communities being served by transportation agencies.

Publications that document the continued advancement and integration of CSS include the 2004 edition of *A Policy on Geometric Design of Highways and Streets* (better known as the *Greenbook*) (4) and the *Guide for Achieving Flexibility in Highway Design* (better known as the *Bridging Document*) (5). The forward of the *Greenbook* promotes design flexibility and environmental sensitivity by stating that:

The intent of this policy is to provide guidance to the designer by referencing a recommended range of values of critical dimensions. It is not intended to be a detailed design manual that could supersede the need for the application of sound principles by the knowledgeable design professional. Sufficient flexibility is permitted to encourage independent designs tailored to particular situations. The effects of the various environmental impacts can and should be mitigated by thoughtful design processes. This principle, coupled with that of aesthetic consistency with the surrounding terrain and urban setting, is intended to produce highways that are safe and efficient for users, acceptable to non-users, and in harmony with the environment (4).

The *Bridging Document* further substantiates the CSS philosophy by recognizing the far-reaching effects of highway

projects on communities and the responsibility of designers to fully understand the reasons behind processes, design values, and design procedures such that they may recognize the many choices and options they have to arrive at a CSS (5). The tone of each of these documents suggests that transportation professionals exercise judgment that is informed by a participatory process that reflects a thorough understanding of the context, including both natural and human environments. Understanding and defining context involves a process that is representative of many different disciplines and a multitude of perspectives, thereby reinforcing the value and utility of multi-disciplinary teams.

Even Congress has recognized CSS as critical for efficient and effective transportation project delivery as is evidenced by the passage of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) in 2005. Section 6002 of SAFETEA-LU identifies the CSS approach as critical toward stewardship and streamlining goals. The legislation specifically refers to the 1997 Flexibility in Highway Design report as well as the 1998 CSS principles to be utilized for establishing standards to be used on the National Highway System. The use of multi-disciplinary teams is specifically called out in these principles.

Most recently, in the fall of 2006, a Peer Exchange was held in Baltimore, Maryland, to share CSS mainstreaming experiences among state DOTs. The goal of this Peer Exchange was to step back and reflect on nearly a decade of work and progress related to CSS programs, policy, and integration into projects and establish the next steps of moving CSS forward as *the way of doing business* rather than *a way of doing business*. Lessons learned were shared among 46 state DOTs, FHWA and AASHTO staff, project stakeholders, and project development partners such as the EPA and Scenic America. A separate peer review session was held for multi-disciplinary teams and CSS. The peer sessions solicited feedback on numerous questions related to success measures for teams, challenges to internal and external team formation, communication strategies, and examples of successful multi-disciplinary team practices (see Appendix A for a summary of responses from the Peer Exchange).

The Peer Exchange culminated with state DOTs identifying action items to continue moving toward full CSS integration. One of the outcomes of the Peer Exchange was a firm commitment between FHWA and AASHTO to partner with state DOTs in integrating CSS throughout the project delivery process.

During the winter of 2006/2007, work began on developing a set of core principles among the qualities and characteristics of CSS identified in 1998. These core principles will represent the progression of CSS from a relatively narrow focus on project design into areas of long-range planning, construction, and maintenance activities. These core principles will include the full intent of 1998 characteristics and qualities, thereby reinforcing the value of multi-disciplinary teams in developing CSS.

Many state DOTs and other transportation agencies have been using multi-disciplinary teams to ensure that stakeholder values are incorporated into the transportation decision-making process. The term “stakeholder” includes all of the external partners, coordinators, collaborators, and customers involved in the transportation delivery process. For example, environmental regulatory agency staff would be considered a stakeholder and has been included on multi-disciplinary teams for decades as part of the NEPA and permitting processes. Stakeholder involvement is a term that includes all of these disciplines, as well as the subset of public involvement, which refers directly to the engagement of the general public. Public involvement specifically deals with the effective and meaningful involvement of the public, including community members, in transportation decision making. Often, the multi-disciplinary team will include a public involvement specialist to represent the interests and needs expressed by community members through a meaningful public involvement process. Utilizing multi-disciplinary teams is a method for bringing the full range of stakeholders together to inform the project delivery process, including problem definition (scoping, purpose, and need), development of evaluation criteria and alternatives, identification of a solution, and implementation. This is supported by *NCHRP Report 480: A Guide to Best Practices for Achieving Context Sensitive Solutions* (6), which suggests bringing together disciplines from areas such as geometric design, traffic engineering, maintenance and operations, environmental impact analysis, landscape architecture, urban design, and public involvement that reflect both human and natural contextual elements. These disciplines represent many prospective stakeholder interests.

Although many state DOTs are using multi-disciplinary teams as part of the project development process, there is no common definition for the organization, management, and expected outcomes of these teams as it relates to CSS. Indeed, state DOTs use many different names for multi-disciplinary teams, including merger team, process improvement team, interagency team, stakeholder working group, project steering team, project study group, and aesthetic review team. The common theme for multi-disciplinary teams is that they are used to understand multiple perspectives and to achieve consensus on solutions. Some argue that the term “interdisciplinary” better represents the intent of CSS, as it implies that something is carried on among or located between disciplines, whereas “multi-disciplinary” describes a presence of more than one discipline, without necessitating interaction. However, to maintain consistency with the 1998 CSS principles, this report will use multi-disciplinary to mean collaborative, cross-cutting interaction among professions and perspectives.

Considering the progression of CSS within the transportation industry over the last 10 years and the evolution of qualities for both process and outcomes related to CSS, one can assign basic characteristics and attributes to multi-disciplinary teams. The CSS approach to transportation decision making suggests that multi-disciplinary teams:

- Fully represent the natural and human context as well as the community’s perspective of a good quality of life.

- Have a set of ground rules by which they operate to ensure inclusiveness of ideas.
- Have a transparent, systematic process in place that allows team members to see how their input is being used to make project decisions. This includes the presence of sincere feedback loops.
- Promote an atmosphere of collaboration that strives toward consensus.
- Exemplify a sense of trust among team members.
- Own the outcome.
- Use good information-sharing practices.

These characteristics and attributes of multi-disciplinary teams have been used to identify and evaluate notable practices throughout this report.

SYNTHESIS OBJECTIVE

The objective of this synthesis was to collect information from state DOTs about multi-disciplinary teams as they are related to CSS applications. The project development or project planning phase of project delivery (post-long-range planning and before construction) was the synthesis focus, because this phase of project delivery has a longer track record with CSS application. This synthesis identifies the following:

- State DOT practices related to CSS policies, guidance, and directives including training initiatives related to CSS.
- State DOT CSS definitions and compositions of multi-disciplinary teams.
- State DOT practices related to incorporating public involvement into multi-disciplinary teams.
- State DOT practices related to integrating multi-disciplinary teams and the decision-making process.
- Case studies that demonstrate notable practices for application of multi-disciplinary teams for CSS-related outcomes.
- Conclusions and recommendations for further study.

The information presented in this synthesis is based on responses received from a nationwide survey of state DOTs (32 of 50 responding), supplemented by a review of available literature including examination of all state DOT websites for information on CSS policies and programs, and information from a 2005 CSS survey conducted by AASHTO (7).

SYNTHESIS ORGANIZATION

This synthesis begins with a brief background review of multi-disciplinary teams and CSS and then examines the state of the practice in CSS and multi-disciplinary team utilization through survey and literature review results. This is followed by several case studies of current and emerging successful practices of multi-disciplinary teams based on the characteristics and attributes of multi-disciplinary teams and CSS. The final chapter provides a summary of the literature review, survey, case studies, and suggested practices and future study topics.

CONTEXT-SENSITIVE SOLUTIONS AND MULTI-DISCIPLINARY TEAMS: CURRENT PRACTICE

The policies, directives, and initiatives driving CSS are still developing with few if any nationally accepted standards and procedures extant. Much of the information sharing on best practices has taken place at awards functions, conferences, in newsletters, on websites, and by means of feedback from CSS training courses. Still, finding specific information in the existing literature related to the formation, composition, and management of multi-disciplinary teams is challenging. Although numerous state DOT projects and programs have been recognized for achievements related to CSS and many have used multi-disciplinary teams to achieve CSS results, few have provided detailed information on the inner workings of such teams. Therefore, the richest source of information related to understanding the use of multi-disciplinary teams in the project development process came from the nationwide survey conducted as part of this synthesis.

The first sections of this chapter provide a brief summary of the relevant literature. The latter part of the chapter reports on the results of the survey.

LITERATURE REVIEW

Research

Although limited research is readily available with regard to multi-disciplinary teams in CSS, there are two efforts that have come to be regarded as seminal to the evolution of the CSS practice. In 2002, TRB released *NCHRP Report 480* (6). Although the report itself does not speak explicitly or consistently about the importance, function, or effectiveness of multi-disciplinary teams, it does state that such teams are an important part of any CSS approach to transportation facility development. The report supports multi-disciplinary teams by organizing its content for the ease of use by the professional disciplines it expects to be involved in CSS work (6).

The other research effort that speaks to the use of multi-disciplinary teams and CSS is *NCHRP Web Document 69: Performance Measures for Context Sensitive Solutions—A Guidebook for State DOTs*, posted online in October 2004 (8). This guidebook was intended to help state DOTs develop their own tailored and comprehensive CSS performance measurement programs. The approaches discussed in the guidebook are suitable for agencies that are just beginning to implement CSS programs, as well as those state DOTs more

advanced in their efforts. Multi-disciplinary teams are identified as important to implementing CSS.

Well-managed, multi-disciplinary project teams enable a diverse array of factors that may influence project development. Team-driven project management philosophies that bring together planners, traffic engineers, public involvement specialists, design engineers, environmental experts, safety specialists, landscape architects, right-of-way staff, construction engineers, and others to work on projects are integral to their success (9, p. 12).

Measuring performance and, by extension, success includes determining if the right people are on the team, as well as how effectively the team functions. Both aspects are highlighted as vital to the success of applying CSS principles to a particular project. It suggests that a “one-size-fits-all” approach be avoided because projects and programs have their own unique context.

Aside from these two reports, no other published research documents were found on multi-disciplinary teams and CSS. Specialized information searches were conducted using the Transportation Research Information Services (TRIS) database and weekly e-mail newsletters featuring information on numerous transportation topics produced by the Bureau of National Affairs (9). These searches generated a number of papers, case studies, newsletters, and legislative briefs that mention the use of multi-disciplinary teams in transportation decision-making processes; however, very little in-depth description of the size, composition, or function of these teams was found.

The professional organizations involved with transportation project development make varied reference to the concept. The American Society of Landscape Architects states that:

A context sensitive design team should consist of multiple disciplines tailored to the unique needs and circumstances associated with the project at hand. The team's composition may change over the course of the project as different issues arise and require varying areas of expertise. The team members from certain core disciplines are essential “common threads” to the success of virtually all significant transportation projects. Civil engineers and landscape architects are chief among the essential core members of context sensitive design teams in transportation (10).

The ITE suggests that:

Successful CSS results from a collaborative, multi-disciplinary, and holistic approach to transportation planning and project

development... and an interdisciplinary approach to planning and design incorporates the viewpoints of the various agencies, stakeholders, and professionals who have roles or areas of concern in the transportation project (11).

The ITE discussion continues by noting that an interdisciplinary team approach can also result in a broader range of potential alternatives that meet multiple objectives. They suggest that the makeup of planning and design teams can vary significantly depending on the nature of the project and can include anyone or any organization connected with the project, including, but not limited to:

Transportation planners, highway/traffic engineers, environmental scientists, resource agency representatives, land use planners, urban designers/architects, landscape architects/urban foresters, property owners, utility and transit owners/operators, community leaders/representatives, elected or appointed officials, and fire, police, and highway maintenance representatives (11).

NCHRP Web Document 69 suggests that a well-managed, multi-disciplinary project team enables projects to be “understood and addressed efficiently.” This document makes an important distinction not found elsewhere in the literature. It notes that although the team may be composed of several disciplines, some of those involved might only be involved in project design and some in only project delivery; that is, the team’s composition can vary according to the project stage (8).

The Surface Transportation Policy Project, one of the non-profit entities involved in CSS, notes that a multi-disciplinary team should be established early, with disciplines based on the needs of the specific project, and with the inclusion of the public (12).

DEPARTMENT OF TRANSPORTATION POLICIES AND PROGRAMS

In 2005, the AASHTO Task Force on CSS completed a survey of all 50 state DOTs. This survey was comprised of open-ended questions designed to obtain a snapshot of state DOT CSS implementation activities, and identified CSS topics of interest to state DOTs. Thirty-eight states offered best practice examples including formal CSS policies, case studies, project development guidelines, public involvement manuals, performance measurement tools, and successful CSS programs. Interestingly, despite the detailed attention to best practices for CSS, little mention was made of notable multi-disciplinary teams’ practices. In the AASHTO survey, state DOTs also indicated some barriers to fully implementing CSS principles including resistance to change, perceived cost increases, delays, and lack of a clear definition of what constitutes CSS. Improvements sought by the DOTs included enhancement to their CSS implementation processes, peer-to-peer learning, and better technological tools for CSS implementation. The results indicated that:

- Thirty-seven states undertook steps to incorporate CSS into their project development process.
- Twenty-five states developed or were developing public involvement plans or practice early stakeholder involvement (an important element of multi-disciplinary teams and of relevance to this report).
- Eight states had formed CSS-dedicated internal committees or teams.

To directly examine the CSS policies and programs and references to multi-disciplinary team use, a review was conducted of all 50 state DOT websites during November 2005. Thirty-seven of the DOT public websites (74%) included statements that expressed recognition of the importance of having CSS as part of their wider mandate. Nineteen (38%) reported that they actually had programs in place, and 16 (32%) explicitly noted that multi-disciplinary teams are a part of their CSS philosophy.

Although multi-disciplinary teams are mentioned somewhat frequently by DOTs, their composition is rarely discussed or documented in any detail. Investigation into those states considered pioneers and/or exemplars in implementing CSS practices yielded some information on multi-disciplinary teams.

The New York State DOT, recipient of the AASHTO Best Practices in CSS Organization or Institution Change Award for 2005, reported that the use of an “inter-professional team” for project development is invaluable (13). MDSHA, another state recognized for its innovative CSS practices, alludes to an interdisciplinary approach, but provides little detail. MDSHA views CSS as a collaborative, interdisciplinary approach that involves all stakeholders developing a transportation facility, but again provides little detail about its composition (14). The California DOT notes that CSS are reached through a collaborative, interdisciplinary approach involving all stakeholders (15).

The Illinois DOT (IDOT) has a formally adopted CSS policy as a response to a state legislative requirement that the agency use CSD and CSS in all of its policies and procedures. In March 2006, IDOT issued a memorandum that clarifies how the flexibility that is a part of highway design is to be used, as well as setting forth provisions for developing and implementing effective stakeholder involvement processes. The IDOT policy directs the formation of a “project study group,” which is described as the multi-disciplinary team that will develop the project (16). The team is comprised of agency staff as appropriate for the specific project, as well as representatives from the FHWA, IDOT Office of Planning and Programming, IDOT division for design and the environment, and metropolitan planning organizations (MPOs). The size and composition of the group are determined by the size and scope of the project, and can change during the process as needed. The recommended list of team members, however, is limited to internal staff and other applicable agencies with ju-

- All states were aware of the CSS principles.

jurisdictional authority over parts of the project development process such as the U.S. Army Corps of Engineers. The multi-disciplinary team relies on stakeholder involvement, which includes public outreach to external stakeholders interested in the project development process.

The Oregon DOT (ODOT) utilizes multi-disciplinary teams at both the program and project levels under its Context-Sensitive and Sustainable Solutions (CS³) process (17). The CS³ process is based largely on the principles of CSS, and provides the framework for the Oregon Bridge Delivery Program, although it is being adopted across the agency as the primary strategy for project delivery. Aside from goals directly related to transportation, the Oregon Bridge Delivery Program also seeks to stimulate Oregon's economy, capitalize on funding partnership opportunities, and use efficient and cost-effective construction and delivery practices. This range of goals requires a multi-disciplinary approach. Therefore, at the program level, team members include specialists from the following divisions of ODOT: Bridges, Economic Stimulus, Diversity, Public Involvement, CS³ Environmental Geotechnical, Railroad, Right-of-Way, Survey, Traffic/Mobility, Utilities, [Computer-Aided Design and Drafting (CADD)], [Geographic Information System (GIS)], and Hydrology and Hydraulics. These discipline leads work directly with stakeholder groups including communities and transportation industry organizations (e.g., Associated General Contractors and American Council of Engineering Companies). Team members and their staffs also work with stakeholders and the project team at the project level to help ensure that the goals of the entire CS³ program are included in the CS³ plan submitted by each project's team, and that the elements needed to meet those goals are implemented during project development and construction.

Two DOTs have used multi-disciplinary teams in their efforts to develop agency-wide programs and policies. The Massachusetts Highway Department convened a 28-member task force to review and revise the department *Design Manual* to include more flexible design guidelines that can better respond to community values and constraints, and include complete and consistent guidance on accommodating pedestrians and cyclists (18). The multi-disciplinary team included directors of public works for towns, highway engineers, city and regional planners, bicycle and pedestrian advocates, a legislative analyst, an attorney, a State Historic Preservation Office representative, a wildlife biologist, and a representative from FHWA. The guidebook they produced pays particular attention to integrated, multimodal approaches into roadway planning and design and setting forth a clear project development process. One of the major goals of revising the *Design Manual* was to ensure that context sensitivity is integrated in the project development and construction processes.

Similarly, in 2001, the Washington State DOT convened the Safety and Aesthetics in Urban Roadway Design Interdisciplinary Group (IDG) to develop policy guidelines for

urban roadway aesthetics design. The IDG was charged with making a comprehensive evaluation of design issues (including safety, operations, community aesthetics, and the natural and built environment) and to support the development of design standards for urban roadway design (19). IDG team members represented various disciplines, including planning, project development staff, managers of local programs, and landscape design, along with representatives from local and federal agencies. The IDG produced a number of documents describing design alternatives for various contexts, clarification of jurisdictions' roles and responsibilities in project development, and guidance on funding frameworks for aesthetics and enhancements.

Public Involvement

The scope of this synthesis report does not allow for a detailed discussion of public participation and outreach techniques used in the project development process. However, it is appropriate to mention this element of the transportation decision-making process in connection with multi-disciplinary teams because it is through public involvement that such teams learn of the community needs, priorities, and ideas that will inform each step of the process.

One strategy used by DOTs to effectively make this connection is to include a public involvement professional on the multi-disciplinary team. The previously described CSS policy at IDOT is one example of this approach; the teams organized for each project include a public involvement specialist. Furthermore, one of the initial tasks of the team is to develop a stakeholder involvement plan. IDOT's stakeholder plan includes outreach to special interest groups, local officials, and community groups, as well as the general public. IDOT policy states that a set of ground rules for stakeholder meetings and the goals and expectations for the process must be established at the outset. The project study group and stakeholders can then meet to develop the problem statement for the project, later moving into a "context audit" exercise, and finally to developing a set of project alternatives. The primary purpose of the IDOT policy is to ensure the early and continuous involvement of stakeholders through a structured involvement plan. This is a new policy for IDOT and experience implementing this policy is therefore limited. The interface mechanism between the project study group and the stakeholder involvement process is evolving. Currently the public involvement specialist is acting as the decision-making bridge between the multi-disciplinary team and the stakeholders.

There are some examples of including public involvement specialists at the program level as well. Florida DOT's (FDOT) Efficient Transportation Decision Making (ETDM) process uses a multi-disciplinary team for each district in the state to streamline the transportation decision-making process. Each team includes a community liaison coordinator charged with engaging communities in the process and establishing a conduit for communities to receive project

information. As previously mentioned, the team organized under ODOT's CS³ program also includes a public involvement specialist to coordinate the public outreach effort.

Performance Measurement of Multi-Disciplinary Teams

The review of research literature and agency practice materials found no specific measurements of multi-disciplinary team members' experience during project development. However, many states have used post-project critiques or lessons learned. MDSHA conducts post-project interviews with local leaders to assess teams' successes and shortcomings. The breadth of these interviews includes concept development, preliminary engineering, and construction phases. As part of MDSHA's business plan, the teams are required to achieve an overall satisfaction rating of at least 90% (20). Another state that does this is Connecticut, where post-project evaluations are used to analyze the multi-disciplinary team's performance at the project level (8).

Summary

The review of current practices and literature related to using multi-disciplinary teams to reach CSS for transportation projects found only a few publications, guidelines, and examples. Very little research or empirical studies are available that describe or analyze how such teams are organized or how they function. However, the literature review does suggest that a core team of professionals be used to fully understand the context of potential projects during the project development phase of delivery. This core team of professionals should include transportation planners, highway and traffic engineers, environmental and social scientists, resource agency representatives, land-use planners, cultural resource managers, urban designers and architects, landscape architects and urban foresters, and construction and maintenance engineers, as well as public involvement specialists. The concept of utilizing a core team of disciplines helps ensure that a broad range of perspectives is consistently and systematically informing the decision-making process for all projects. Additional members of a multi-disciplinary team could include property owners, utility and transit owners and operators, community leaders and representatives, elected or appointed officials, fire departments, police departments, and artists. The goal is to ensure that the team fully represents the natural and human context as well as the community's perspective of a good quality of life.

The literature review was informative concerning composition of multi-disciplinary teams; however, the results of the survey of state DOTs discussed here help in understanding the current state of the practice. The survey primarily provides information on how, when, and why teams are formed. The case studies presented in chapter three go a step further in revealing some notable practices for the function of multi-disciplinary teams.

NATIONAL SURVEY

Survey Methodology

In addition to reviewing existing publications and guidelines, a survey was conducted to collect information from all state DOTs. The results of the nationwide survey provided good baseline information on where the industry stands in their understanding of multi-disciplinary teams. Systematically measuring the current state of these structures, processes, and attitudes can highlight areas where good progress is being made and where more attention is needed. The survey conducted in connection with this synthesis is an important contribution in this direction.

The survey was designed to focus on state DOTs and their practices of applying CSS principles and practices as they relate to the use of multi-disciplinary teams during project development activities. E-mail contact information was obtained by the recent AASHTO CSS survey of state DOTs and supplemented by contact information obtained from the Context Sensitive Solutions website (www.contextsensitivesolutions.org), as well as personal contacts. The AASHTO survey respondents were used to ensure the best possible contact with state DOTs. The continuity between AASHTO's survey and this synthesis survey helped to ensure the quality of responses from high-level staff who know the agencies' day-to-day activities and understand their progress in institutionalizing CSS.

The survey format was created as an online web application with built-in reporting tools to generate "real-time" results. Potential respondents were sent an e-mail letter of project support provided by TRB. The survey was launched on the World Wide Web on March 24, 2006. Initially, participants were given a two-week time period to respond. However, to increase respondent participation, deadline extensions were allowed up to May 5, 2006. The survey had a response rate of 64%, with 32 states responding (see Figure 1). The survey instrument and accompanying materials are presented in Appendix B and the tabulated survey results are in Appendix C. The survey examined the following issues and questions:

- Current state DOT CSS practices including CSS policies and initiatives, CSS practices and applications, and CSS training;
- Defining multi-disciplinary teams and composition;
- The role of public involvement in multi-disciplinary teams; and
- Integrating multi-disciplinary teams and decision making.

The following sections present the survey results organized into these four areas.

Context-Sensitive Solution Policies, Initiatives, and Directives

This section presents information related to state DOT efforts to recognize CSS through various types of initiatives including

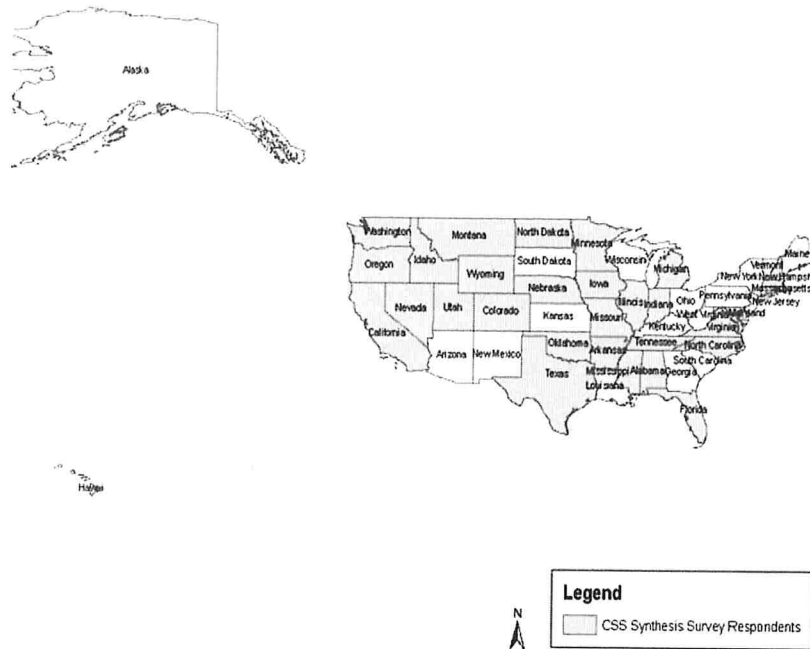


FIGURE 1 Geographic distribution of survey respondents.

training opportunities. Information regarding CSS applications and practices is presented to understand how state DOTs view CSS within the construct of their agency. CSS training information is included to understand which disciplines receive training (see Appendix C, Questions 10–18).

Survey Results

Each state was asked what types of CSS policies, directives, and initiatives are in place at their agency. The results are shown in Figure 2. Nearly 60% of the state DOTs responding have adopted DOT CSS policies and nearly half have CSS guidance. Six states—Hawaii, Illinois, Oregon, Texas, Vermont, and Washington—indicated that there is CSS-specific legislation in their state. Other related policies, directives, and initiatives included aesthetic, environmental stewardship, and streamlining policies, and design manuals that include a CSS policy statement. Five of the 32 states indicated that there were no current CSS policies, directives, or initiatives in place in their agency (see Figure 2).

In addition to current DOT CSS policies and initiatives, context-sensitive applications and practices were also assessed. All respondents indicated one or more CSS application and practice employed throughout their agencies, although five states responded that they had no current policy initiatives in place. All five that indicated they had no CSS policies, directives, or initiatives identified consultation with environmental resource agencies and multi-disciplinary team participation as a CSS application at their agency. Figure 3 highlights these findings.

Other applications and practices receiving high numbers of responses included consultation with environmental resource agencies (28 states), CSS training (25 states), community visioning (21 states), innovative public involvement techniques (21 states), funding community partnerships (18 states), and CSS work/task groups (17 states). Twelve states indicated that they are incorporating CSS into local transportation planning. The state of Utah reported incorporating CSS curriculum into university and elementary school education as another CSS application.

Twenty-nine states responded that their agency receives CSS training. Most often this training is provided through the state DOT (15 states), National Highway Institute courses (13 states), and private consultants (9 states). Six DOTs receive training from universities and one state receives training from a nonprofit organization. Most of the agencies are in the initial stages of staff training. Fully 50% of respondents report that 100 or fewer employees have received CSS training.

Additionally, it should be noted that the training is predominately provided to staff involved in the project development phase of the transportation delivery process. The breakdown of functional groups that receive CSS training is shown in Table 1.

Although most states indicated that multiple disciplines in their organization receive CSS training, the majority, more than 90% (29 of 32), are from an engineering background. The extent of the training by profession is shown in Figure 4.

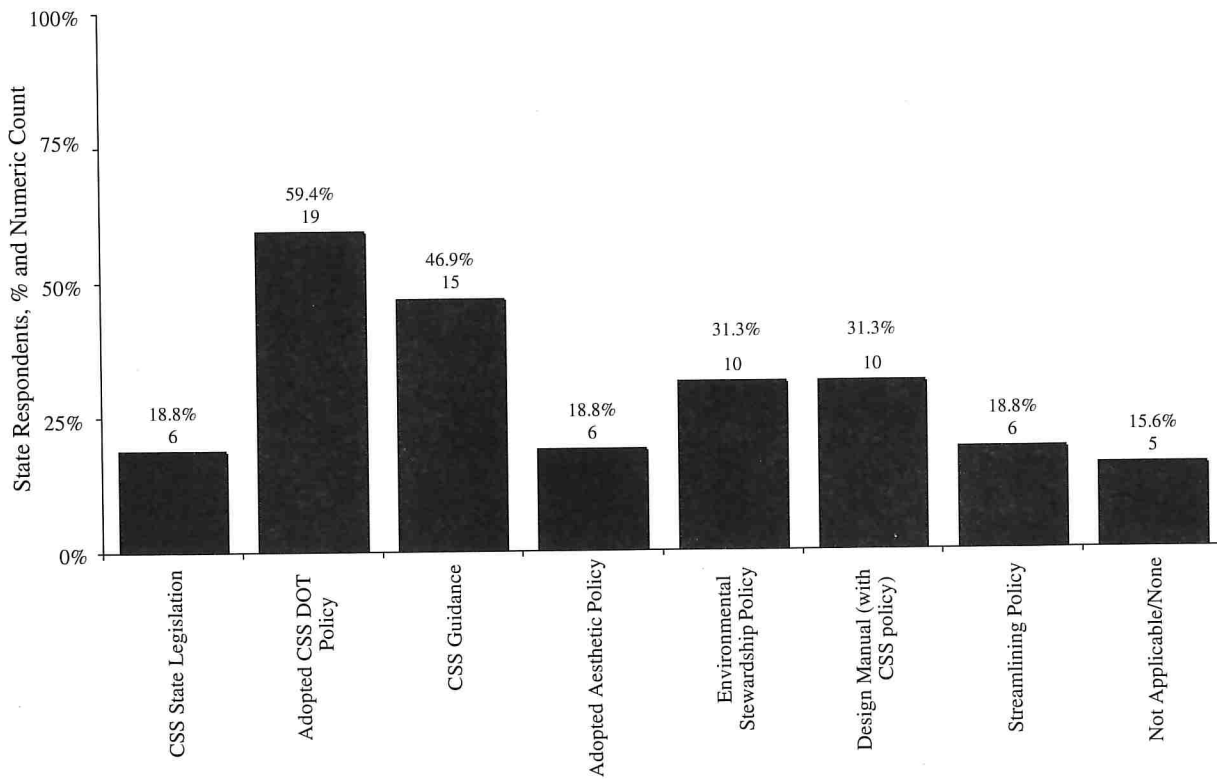


FIGURE 2 Policies, directives, and initiatives in place.

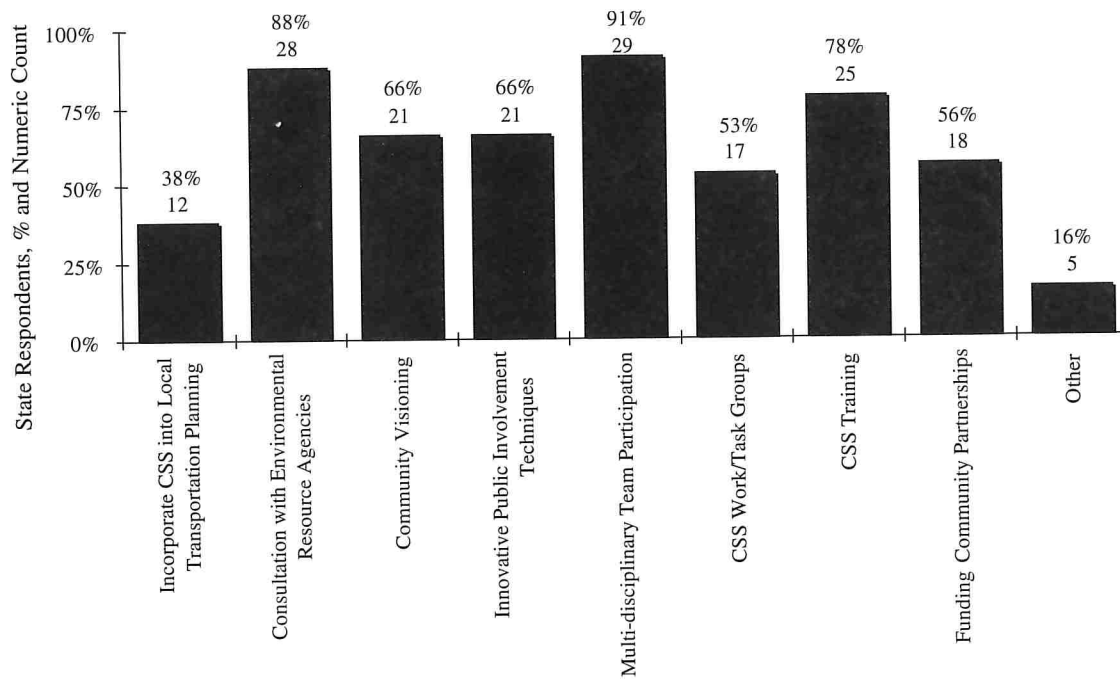


FIGURE 3 CSS applications and practices by agency.

TABLE 1
WHICH OF THE FOLLOWING FUNCTIONAL GROUPS
IN YOUR AGENCY RECEIVED CSS TRAINING?

Group (Staff)	Percentage	No. of States
Design*	88	28
Environmental*	81	26
Long-Range Planning	56	18
Right-of-Way*	44	14
Operations and Maintenance	40	13
Programming	34	11
Other	13	4
Agency/Organization Does Not Provide CSS Training at this Time	6	2

*Project Development Staff.

When asking state DOTs about training for groups external to the agencies, 15 states (47%) responded that local government officials and staff receive CSS training. Only 7 states (22%) responded that key community leaders and/or community organizations and neighborhood groups received CSS training through the agency. Only three states (approximately 9%) responded that citizen action groups receive training.

Finally, participants were asked whether the CSS training was representative of a multi-disciplinary team. This question was posed to ascertain whether the CSS training initiatives of the state were inclusive of the previously mentioned groups (functional groups, disciplines, and other groups and individuals) and to aid in the definition and composition of multi-disciplinary teams in the following section. More than 70% of those responding (21 states) reported that training is provided to a range of individuals who are representative of a multi-disciplinary team. Of additional note is that 7% noted that the training provided was not to individuals representative of multi-disciplinary teams, and 23.3% provided no response to this question.

Summary Points

- Nineteen states surveyed have an adopted CSS policy and 15 have guidelines for using CSS.
- The most common CSS applications selected by the 32 states that responded to the survey include use of multi-disciplinary teams, consultation with resource agencies, and CSS training. More than half of the responding states have some type of work group that is related directly to CSS. The survey results do not provide enough data to reflect on the differences between what the state considers to be a multi-disciplinary team versus a CSS work group.
- Twenty-nine states have offered CSS training to their staff; however, overall the number of individuals being trained is relatively low, with more than half training

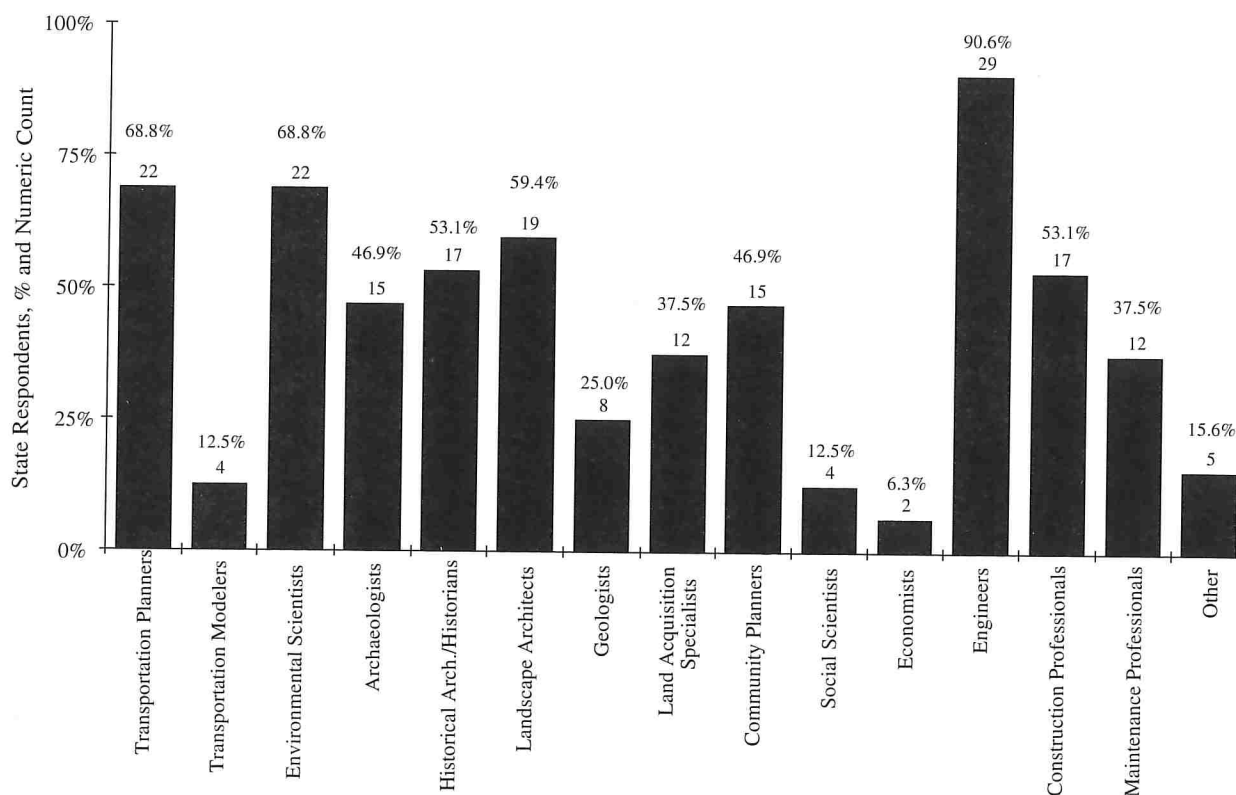


FIGURE 4 CSS training extent by profession.

fewer than 100 persons within their organization. This reflects a low level of training effort among most of the states responding to the survey.

- The majority of those trained come from project development. The disciplines receiving the most training are engineers (91%), transportation planners (69%), and environmental scientists (69%). Local government staff and officials are the external stakeholders most often receiving training through the DOTs. Although engineers, transportation planners, and environmental scientists technically constitute a multi-disciplinary team, it may not be reflective of the characteristic of multi-disciplinary teams that should fully represent the natural and human context as well as the community's perceptive of a good quality of life. These results can be explained because in most state DOTs these disciplines are more heavily represented than other disciplines. Consequently, it appears that DOTs are focused primarily on training internal staff and external staff such as local government staff that often have legal jurisdiction over process elements. There is evidence that some state DOTs are training other disciplines, including community members and special interest groups. For example, the Minnesota DOT reserves a third of its CSS classes for external stakeholders who represent community interests. This is an interesting example of relationship building that can build trust and increase the potential for consensus towards CSS.

Definition and Composition of Multi-Disciplinary Teams

This section reviews how state DOTs define and structure multi-disciplinary teams, including how team members are

selected, and participating organizations, and how DOTs decide when to use a multi-disciplinary team. The survey results reported in this section relate to Questions 19–24 (see Appendix C).

Survey Results

Thirty-one states (97%) responded that their agency used multi-disciplinary teams in the project development process. Twenty state DOTs use multi-disciplinary teams structured as internal teams and 18 state DOTs use internal/external (inclusive of community representation). One-quarter of the DOTs responded that they use formalized, internal/external team charters (outside organizations and agencies only).

Twenty-four states DOTs (75%) responded that participants of the team are generally selected for inclusion based on the context or project-specific information. Local government input (17 states, 53%), and upper management decisions and standard DOT policies (13 states, 41% for each) also played a substantial role in how participants are selected for teams. Approximately one-third of the responding state DOTs noted that resource agency and MPO/rural planning office (RPO) input was used in participant selection.

Furthermore, the survey queried participants about what groups or organizations had been asked to participate on a CSS-based, multi-disciplinary team. Thirty state DOTs responded that state and federal agencies were part of a multi-disciplinary team, with 27 reporting that local government was included on these teams (see Figure 5). Nineteen states included key community leaders, community organizations, neighborhood groups, and citizen action committees as

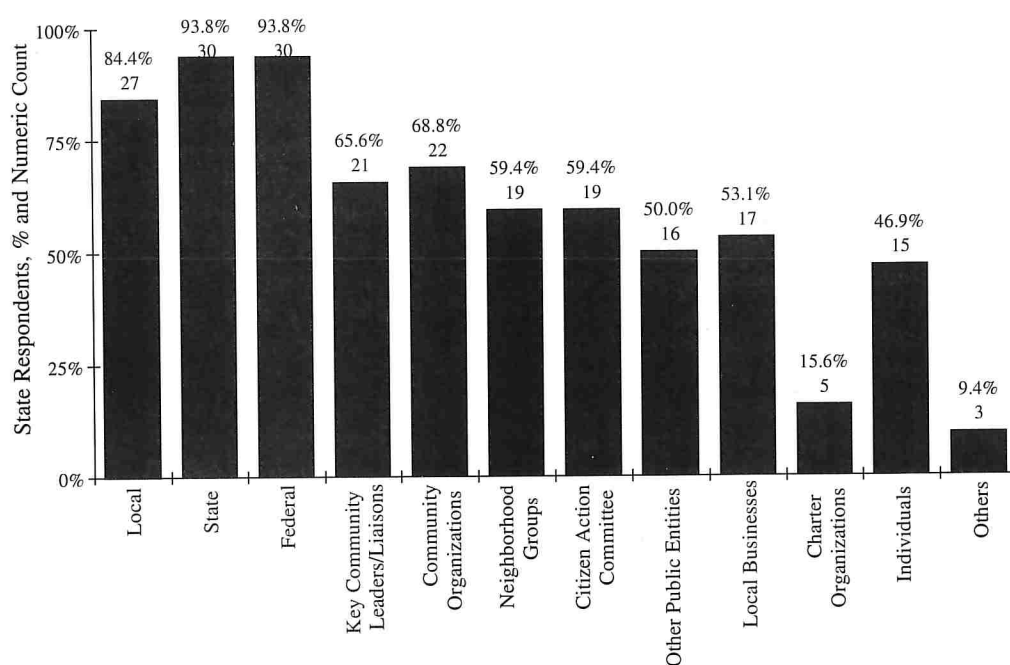


FIGURE 5 Groups or organizations asked to participate in CSS-based multi-disciplinary terms.

members of a multi-disciplinary team. Other team members listed included consultants, charter organizations, environmental groups, and fire and police departments.

Eight state DOTs indicated that multi-disciplinary teams are used as standard policy (see Figure 6).

About half the respondents stated that public controversy and the size of a project determined the use of multi-disciplinary teams. Natural resource issues and the level of NEPA documentation required are also common decision triggers for the use of multi-disciplinary teams.

The survey asked about the different names used for multi-disciplinary teams. Some examples are highlighted here (the complete list can be found in Appendix C).

- Aesthetic review teams
- Design advisory committee
- Interagency leadership teams
- Process improvement teams
- Programmatic environmental stewardship
- Road design manual review teams
- Stakeholder working group
- Statewide transportation planning work groups
- CSD&S steering team
- Environmental technical advisory teams
- Merger teams
- Technical advisory committee
- Project steering team
- Scoping group
- Value engineering team
- Project study group.

Summary Points

- Thirty-one of 32 respondents reported that they use multi-disciplinary teams in project development. Twenty-four state DOTs use internal teams; however, an almost equal number mentioned that they use internal/external teams with community representation. A few states have team requirements as part of their CSS policy directives. It is clear from the responses that DOTs perceive themselves to be utilizing multi-disciplinary teams, but it is not clear whether the practice of using internal teams fully represents multiple perspectives as defined by the project context.
- Twenty-four state DOTs review the project context to determine the composition of multi-disciplinary teams. The next most common method is to rely on local government input and/or upper DOT management recommendation, or to adhere to standard DOT policy or procedure. It is encouraging that state DOTs are using project context to guide team participant selection; however, the process used to determine the context is unknown. Therefore, it is difficult to assess the efficacy of this context-driven approach. Because internal multi-disciplinary teams were the most commonly reported type of team, many state DOTs may view internal team members of varied disciplines to represent all facets of a project context. If this practice is as common as the survey data suggests, then DOTs should be cautious in assuming that internal team members represent all aspects of the context, particularly community perspectives. Even local government representation may not be adequate to fully represent community perspectives. Measuring the satisfaction of community members regarding project decisions could

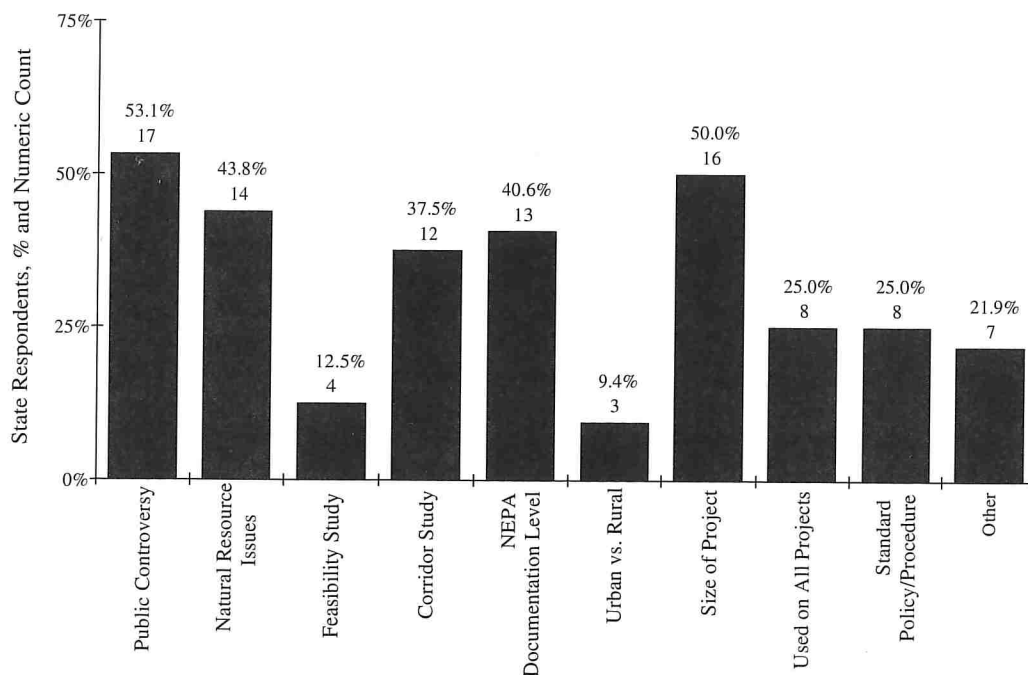


FIGURE 6 Reasons cited for using multi-disciplinary teams.

help in determining if these internal teams are making decisions that reflect community values.

- Twenty-nine states responded that federal and state agencies are most often the likely team members of the external teams. Local government representatives are the next group that was selected as a participant on the multi-disciplinary teams. Again, the data points toward state DOTs focusing primarily on team members who have legal jurisdiction over some part of the decision-making process. Although half of the respondents did include other participants who represent community perspectives, half did not. Further probing that examines the effectiveness of a team that consists primarily of state, federal, and local government officials and staff is necessary to assess if these teams fully represent the human and natural environment, as well as the community's perception of a good quality of life.
- More than half of the respondents said that the decision trigger for using a multi-disciplinary team is based on the size of the project and the expected level of public controversy. Natural resource issues and the level of NEPA documentation were the second most commonly identified decision trigger. Only eight states reported that multi-disciplinary teams are used on all projects and/or are part of their standard policy and procedures. These responses are of particular concern owing to the national push by FHWA and AASHTO to have CSS become a business practice that is applicable to all phases of project delivery. Thirty-one states noted that they used multi-disciplinary teams, but the results of this question suggest that those teams are used for large, complex projects that attract the most concern from local, state, and federal agencies.

However, it is well known that small projects, such as bridge replacement projects, are often located in sensitive environments where defining the context with adequate stakeholder involvement is crucial to developing acceptable solutions.

Public Involvement and Multi-Disciplinary Teams

The survey sought to discover how community perspectives are being represented in multi-disciplinary teams, what processes govern their selection of representation, and the techniques used to inform the larger community of the work of multi-disciplinary teams (see Appendix C, Questions 25–29). Specific areas addressed in this section include inclusiveness of community representation, process of selection, guidance and governance of teams, techniques to ensure that community needs and interests are included in decision-making processes, and methods of information sharing within the team.

Survey Results

Participants were first asked to define how community perspectives are represented on the multi-disciplinary teams. Twenty-eight states use a summary of public meeting comments to represent community perspectives and 24 states select the input of local elected officials as the mechanism to represent community views (see Figure 7).

Figure 8 highlights the processes used in selecting community representation on multi-disciplinary teams. Twenty-four state DOTs (75%) use local government input as the process to

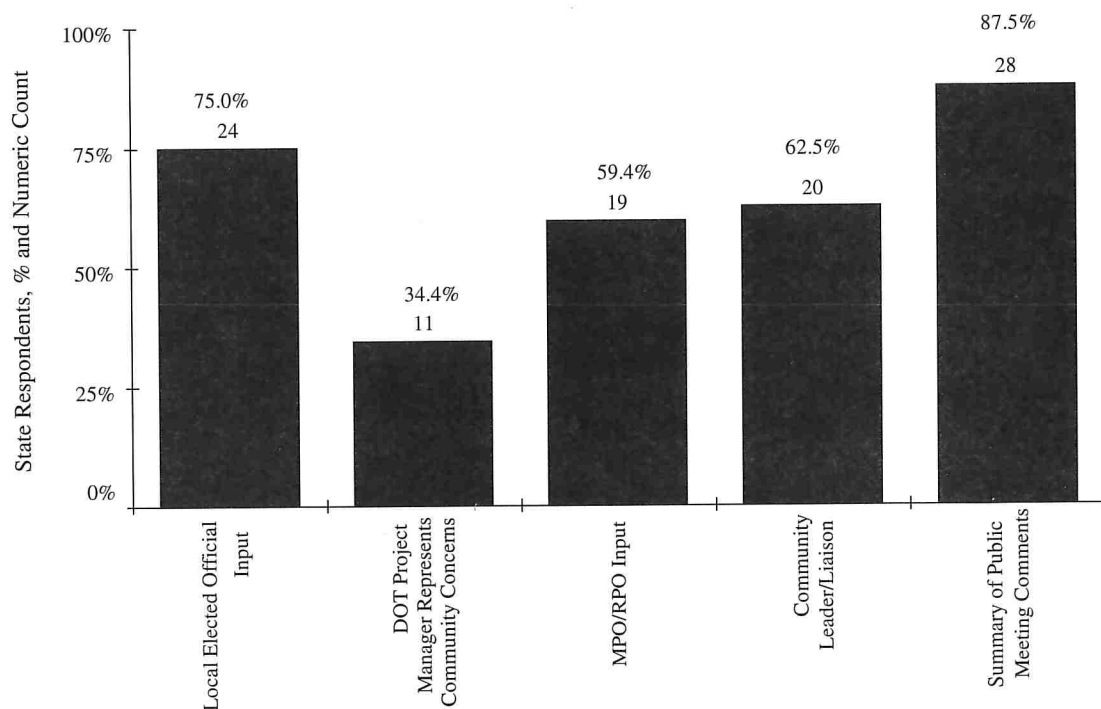


FIGURE 7 How community views are represented on multi-disciplinary teams.

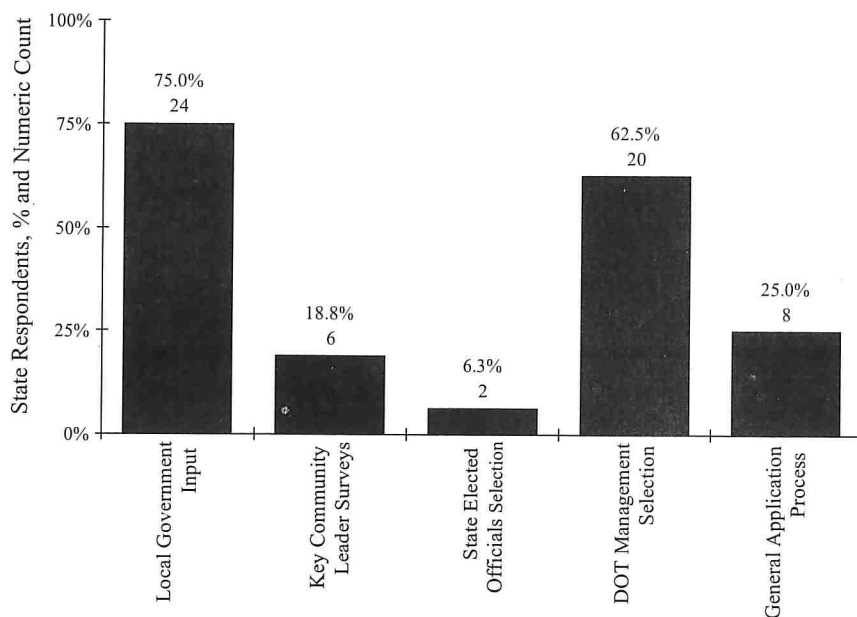


FIGURE 8 Process for selecting community representation on multi-disciplinary teams.

select community representatives. Twenty states select team members based on decisions by DOT management.

Responding DOTs were also asked about the types of rules and processes used in connection with multi-disciplinary teams. Sixteen state DOTs reported using team charters (inclusive of defined roles and responsibilities) and general DOT policy (inclusive of time limits, review periods, and critical milestones) as frameworks to govern the multi-disciplinary team process. Ten states (31%) use neutral facilitators for meetings, and three (9%) reported that they have a dispute resolution process.

The methods through which information and decisions from the multi-disciplinary teams are disseminated to the public are indicative of how multi-disciplinary teams interact with the larger community. Figure 9 shows various information dissemination methods as indicated by the survey respondents.

Twenty-seven state DOTs use public comments presented by DOT staff to multi-disciplinary teams as the means to affect decision making.

Figure 10 shows how information from and decisions by the multi-disciplinary team are disseminated to the general public. The most common methods are open forum meetings, websites, and newsletters.

Summary Points

- The survey reveals that community views are most often represented on multi-disciplinary teams by a

summary of public comments and from local government input.

- The process for selection of community representation on multi-disciplinary teams is predominantly by means of local government input and state DOT management selection. Both of these methods rely on either local government staff or state DOT management to fully understand the community dynamics to make the best representation choices. If a selection is made without the input of the wider community, the multi-disciplinary team may not fully represent the community's perspectives of a good quality of life. If the community does not support the selected representative then trust in the overall process may be in question, as well as a reluctance to own the outcome.
- Sixteen state DOTs, half of the respondents, noted that multi-disciplinary team processes are governed by DOT policy and team charters. This suggests that many DOTs may not have any type of rules that govern their multi-disciplinary team process. Set rules and responsibilities agreed on by team members can promote an atmosphere of collaboration, build trust, encourage good information sharing practices, and ultimately forge a consensus on project outcome.
- Public comments are the primary mechanism by which most state DOTs ensure that public interests and needs are brought into the decision-making process. Taking this response with the previous question about how views are represented on multi-disciplinary teams, it is clear that DOTs are relying on public comments to inform decision making. This calls into question the effectiveness of public involvement techniques in retrieving these public comments. If multi-disciplinary

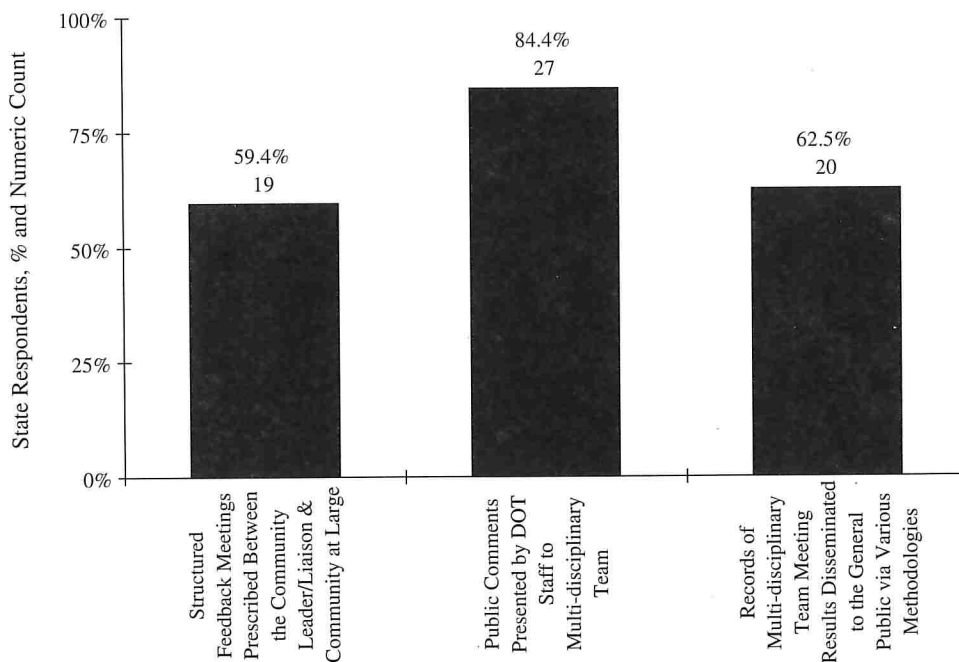


FIGURE 9 Mechanisms, approaches, and techniques to ensure public interests and needs affect the decision-making process.

teams are using public comments to inform their decision-making efforts then efforts to measure the effectiveness of public involvement activities are essential to ensure that the community's perspectives are accurately and fully reflected in the public comments.

- The primary public information and decision dissemination methodologies used by state DOTs are open

forum meetings, websites, and newsletters (listed in order of use). These techniques are considered traditional public involvement that may not reach nontraditional populations such as illiterate and/or low-income individuals. Effective and meaningful public involvement is critical to full representation of community perspectives on multi-disciplinary teams. Further research

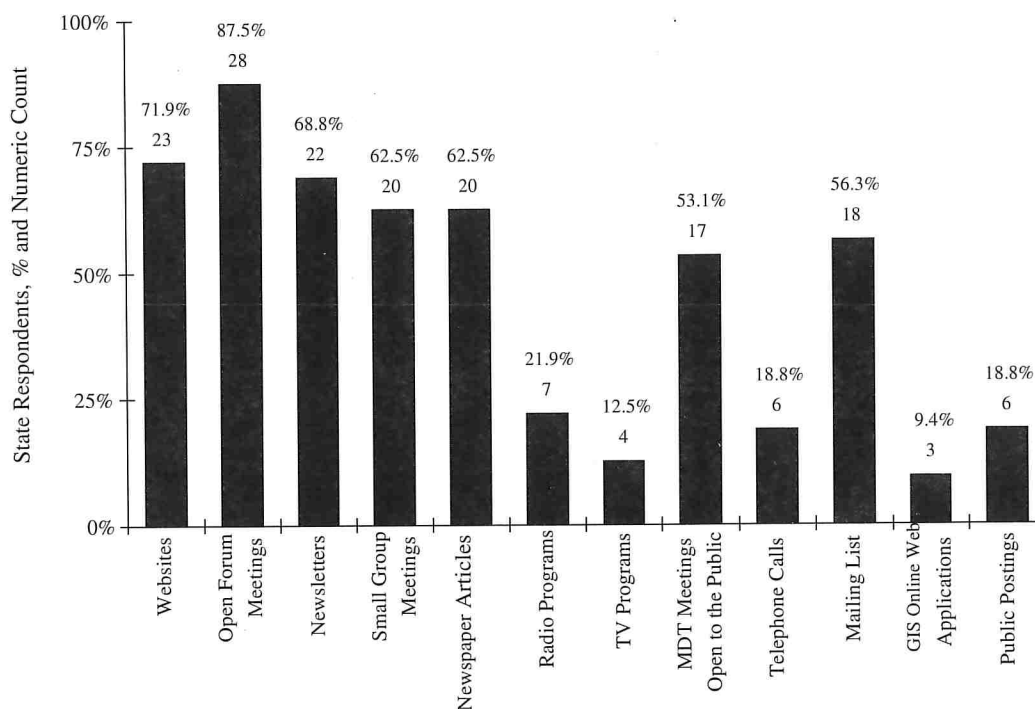


FIGURE 10 Public information and decision dissemination methodology.

in the area of evaluating how the results of effective public involvement are transmitted to and from a multi-disciplinary team should provide state DOTs with effective strategies for making sure communities' interests and needs are fully represented.

Multi-Disciplinary Teams and Decision-Making Process

This section of the report focuses on understanding how state DOTs use multi-disciplinary teams in their project development decision-making process, including what types of projects use multi-disciplinary teams and the time frames for forming such teams. It also seeks to understand how long-range planning efforts are linked to project development efforts through multi-disciplinary teams and how satisfaction with the performance of multi-disciplinary teams is measured by state DOTs. The survey results reported in this section relate to Questions 30–36 (see Appendix C).

Survey Results

Twenty-seven states indicated that they are using multi-disciplinary teams as part of the project development process. However, as previously indicated, the type and scale of the project is most often the largest predictor of where multi-disciplinary teams play a role.

Because public controversy, size of project, and level of NEPA documentation were highlighted as the primary deciding factors in whether to use a team approach, it makes sense that projects requiring environmental assessments

(EA), environmental impact statements (EIS), or corridor studies are the most common type of projects in which multi-disciplinary teams are used (see Figure 11). Other types of projects that involve multi-disciplinary teams include categorical exclusions and feasibility studies. Eight state DOTs use multi-disciplinary teams on all projects.

State DOTs reported various ways of linking the long-range transportation planning process to the project development work of multi-disciplinary teams. The most common approach was including a representative from the MPO/RPO on the team (19 states, 59%). Consultation with MPO/RPO Advisory Committee members was reported by 10 states (32%). The use of documentation from the long-range transportation plan and the inclusion of the long-range transportation planner on multi-disciplinary teams are used by 13 states and 12 states (41% and 38%), respectively.

States generally reported that multi-disciplinary teams are formed early in the transportation decision-making process. Fully one-third of responding states reported that teams were formed before the determination of project purpose and need. Eleven (36%) form teams during the project scoping process. Only four (13%) reported forming teams when the range of alternatives was selected, and no states reported doing so during the preferred alternative selection phase. Six (19%) reported that the timing of team organization was either at other points in the process or was project dependent.

The most common response to a question on methods to assess DOT satisfaction with a teams' performances was the use of post-project critiques or "lessons learned" discussions (12, 38%). Four states (13%) use surveys. Other methods

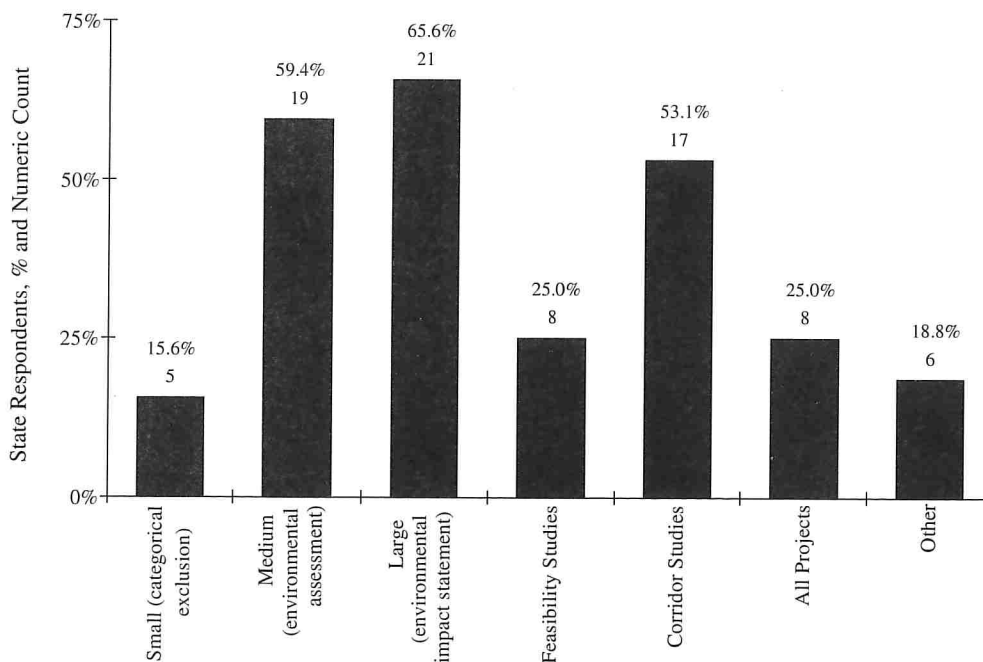


FIGURE 11 Multi-disciplinary team usage by project.

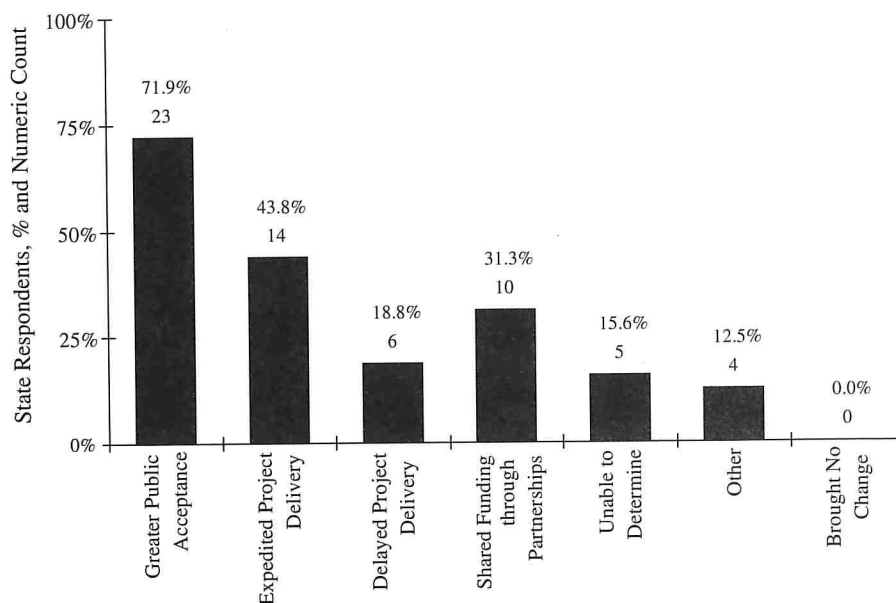


FIGURE 12 Impacts of using multi-disciplinary teams.

used included “review and comment,” “discussion for future processes,” and “level of support for final product.” One respondent stated, “Our typical approach tends to be inconsistent and informal.”

When state DOTs were asked how multi-disciplinary teams affected the project development process, 23 responded that it resulted in greater public acceptance. Fourteen state DOTs responded that expedited project delivery was a result of using a multi-disciplinary team and 10 responded that shared funding through partnerships was a positive effect of multi-disciplinary teams (see Figure 12). Six states responded that teams delayed project delivery. It should also be noted that those same six state DOTs also noted positive benefits including greater public acceptance (five), opportunities for shared funding (three), and, interestingly, expedited project delivery (two).

Summary Points

- Multi-disciplinary teams are most often used for large projects such as those requiring an EIS or medium projects that require an EA. In addition, corridor studies were ranked high for utilizing multi-disciplinary teams. This is not surprising in that these projects usually require extensive coordination with a wide range of

stakeholders, including environmental regulatory agencies, local governments, and special interest groups.

- Thirty-six percent of the respondents selected the scoping process as the point when a multi-disciplinary team is formed in the project development process. Thirty-three percent responded that the teams were formed before the purpose and need statements. It is encouraging to see that teams are being formed early in the project development process; however, many state DOTs chose not to respond to this question, so it is difficult to know if this is representative of the larger DOT community of practice.
- Most state DOTs use MPO or RPO representation on a multi-disciplinary team to link long-range planning to project development.
- Post-critique and lessons learned discussions were selected by 38% of respondents as the method to gauge satisfaction of the team’s performance. Because many DOTs chose not to answer this question, it appears that they may not have a process in place to evaluate the effectiveness of their team’s performance.
- More than 70% of respondents believe that the use of CSS multi-disciplinary teams results in greater public acceptance, and 44% believe that they expedite project delivery. This suggests that DOTs do value multi-disciplinary teams as a method for stakeholder involvement.

CHAPTER THREE

CASE STUDIES

As presented in chapter one, eight characteristics and attributes of multi-disciplinary teams were developed to reflect the concepts and principles of CSS. These characteristics and attributes are listed here.

- Multi-disciplinary teams fully represent the natural and human environment, as well as the community's perspective of a good quality of life. (The teams are representative of the project's context.)
- Multi-disciplinary teams have a set of ground rules by which they operate to ensure inclusiveness of ideas.
- Multi-disciplinary teams have a transparent, systematic process in place that allows team members to see how their input is being used to make project decisions. This includes the presence of sincere feedback loops.
- Multi-disciplinary teams are consulted early in the decision-making process before purpose and need, and scoping.
- A collaborative process is used that promotes consensus.
- Multi-disciplinary teams exemplify a sense of trust among team members.
- The multi-disciplinary team owns the outcome.
- The multi-disciplinary team has good information sharing practices.

A series of questions were developed to collect information on policies and practices related to the use of multi-disciplinary teams on specific projects. These questions provided a framework for discussion with agency and project staff for potential case studies.

CASE STUDY CRITERIA AND DEVELOPMENT

The case studies presented in this section of the synthesis were selected based on the following criteria:

- State DOTs must have responded to the nationwide survey administered in connection with this synthesis project.
- Consideration was given to the five state DOTs that were CSS pilot states identified after the Thinking Beyond the Pavement Workshop in 1998 and to states that have a formal CSS policy in place. The Context Sensitive Solutions website (www.contextsensitive.solutions.org) was reviewed for possible case studies that specifically mention the use of multi-disciplinary teams.

- Following the survey and the literature review, 17 states were identified as possibilities for case studies. Following consultation with CSS experts knowledgeable about nationwide CSS projects and programs, the candidate list was narrowed to eight states that were anticipated to provide examples of the most advanced practices related to the utilization of multi-disciplinary teams in project development.

Each of the eight selected state DOTs was contacted by telephone. Four of the eight responded within the deadline required to meet overall schedules for completion of the synthesis report. Three of the responding states (Maryland, Nevada, and Utah) described the application of multi-disciplinary teams on specific projects. These case studies represent rural and urban projects, and vary in overall project size. One responding state (Florida) discussed a programmatic approach to using multi-disciplinary teams. Follow-up telephone calls to key project staff were made as needed to gather additional detail and probe further into critical areas.

Each case study begins with a section that discusses the state's CSS philosophy, followed by a description of the context of the project or program. Specific information on the organization and function of multi-disciplinary teams is included. Each case study concludes with a list of the notable practices that provide specific examples that illustrate the characteristics and attributes of multi-disciplinary teams provided earlier.

I-580 FREEWAY EXTENSION PROJECT, RENO TO CARSON CITY, NEVADA

Nevada Department of Transportation Context-Sensitive Solution Philosophy

The Nevada DOT (NDOT) does not have a formal CSS policy. NDOT does however seek to apply CSS principles in project development. The agency is also applying CSS in its planning activities through its Landscape and Aesthetics Program, which was launched in 2000. This program provides a framework for project development that incorporates community perspectives and elements of the natural environment into highway design, landscaping, and maintenance and management operations. One of the core elements of the landscape and aesthetics program is that local communities, the public, permitting agencies, and the private sector are encouraged to

be involved in the planning, design, construction, and maintenance of transportation projects.

Defining the Context

Transportation Need

The I-580 Freeway Extension project constitutes the final, 8.5-mile segment of Nevada's I-580 (see Figure 13). The completed six-lane facility will link the state capital, Carson City, to the Interstate system, the Reno metropolitan area, and the Reno-Tahoe airport. The primary project purpose and need is to improve safety and capacity. The current route connecting Reno and Carson City is US-395, an undivided four-lane rural highway that passes through the areas of Steamboat, Pleasant Valley, and Washoe City. The facility carries some 35,000 vehicles daily, with very high accident rates. The area is undergoing rapid development and traffic is expected to increase by 4% annually.

The I-580 Freeway Extension project was designated by NDOT as a "Super Project"; a large-scale, high-priority projects. The agency has been working toward having the entire length of I-580 built to freeway standards since the 1950s; however, a series of legal challenges and changes in federal legislation brought long delays at various stages of the project. Although the final EIS was completed in 1983, and a general alignment was selected, there had been no further progress on the segment for 20 years.

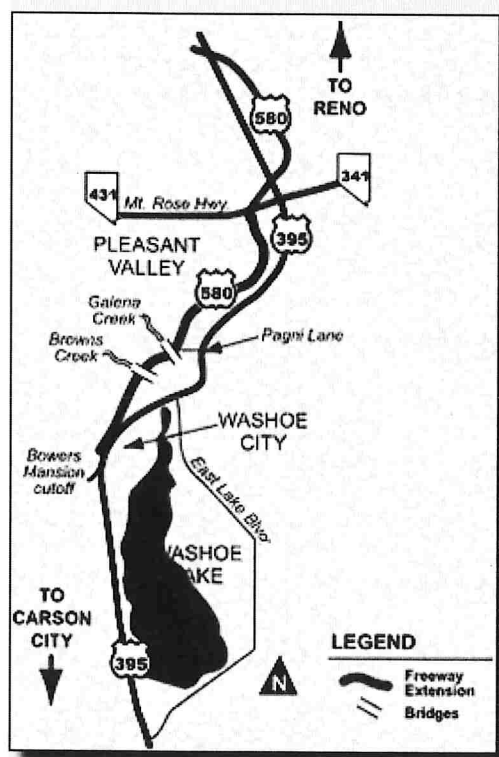


FIGURE 13 I-580 Freeway extension project area map. (Source: www.freewayextension.com.)

Human Environment

Although the alignment went through undeveloped land, there were several communities nearby. These areas have been experiencing rapid commercial and residential development. There were also some archeological sites in the project area; however, surveys indicated these would not be disturbed by the project. The right-of-way crosses some geothermal areas that were tapped by a nearby, privately owned power plant, which required securing an easement.

Natural Environment

There were important issues related to the natural environment. The climate and winter conditions require design elements that facilitate maintenance (snow plowing and de-icing), incident management, and facilities that allow motorists to safely chain up in winter. Maintaining water quality in existing drainages and wetlands was an important requirement. The design also needed to carefully control erosion through stormwater management and revegetation using native species. Wildlife crossings needed to be minimized, especially for deer, to lessen the dangers both to animals and motorists. Local geothermal conditions and "hot" soils required careful consideration to construction materials and methods. These soil conditions also placed serious constraints on feasible alignments. The alignment crosses several drainages, requiring large bridges in addition to the extensive retaining walls needed for the sidehill construction.

Community Perspective

The nearby residents were concerned with the visual and aesthetic effects of the project, especially on the mountain viewshed as seen from residential areas. Bridge design, road cut details, and surface treatments on retaining walls and hillsides were noted as high aesthetic priorities. Maintaining connections between the developing commercial and residential areas for pedestrians and cyclists was a community concern. Providing safe crossing points for equestrians was another important issue raised by the community. Because the corridor passed close to some residential areas, noise and light pollution were key issues. Community representatives also expressed concern about the natural environment issues mentioned previously.

Multi-Disciplinary Team

Recognizing the tremendous amount of public interest and the contentious history of the project, NDOT took a CSS approach to moving the project forward. In 1998, a multi-disciplinary team was formed to develop the design for the selected alignment that would fit the needs of the community and the environment as well as meet the transportation need.

The multi-disciplinary team was comprised of three subgroups: a Project Steering Team (PST), a Project Management Team (PMT), and a Stakeholder Working

Group (SWG). The PST consisted of the high-level decision makers for the region. This subgroup was responsible for:

- Providing general guidance,
- Formally approving design ideas, and
- Securing funding and final approval for the project.

The PMT included NDOT staff and consultants, and was responsible for:

- Providing training for the SWG in specialized topics through seminars titled “Lighting 101,” “Traffic 101,” “Bridges 101,” “Noise 101”;
- Producing visual simulations of design alternatives; and
- Incorporating community concerns into the final design.

The SWG included members who represented a wide range of community values and viewpoints (see Figure 14). This subgroup was responsible for:

- Representing their constituencies,
- Providing input and guidance on design issues, and
- Making recommendations to the design team.

The organizations and agencies represented on each subgroup are provided here.

- Project Steering Team (PST)
 - FHWA representative
 - Regional MPO director
 - County commissioner
 - Public works director
 - NDOT deputy director.
- Project Management Team (PMT)
 - NDOT staff
 - Consultant staff.
- Stakeholder Working Group (SWG)
 - Regional transportation commission (engineering and citizen advisory committee)



FIGURE 14 SWG at work. (Source: www.freewayextension.com.)

- U.S. Army Corps of Engineers
- FHWA
- Washoe Tribe
- Local fire protection district
- Chamber of commerce
- Trails interest group
- County engineering office
- Bureau of Land Management
- State highway patrol
- Environmental interest groups
- State environmental protection agency
- Local planning consultant
- County community development office
- County parks department
- Local citizen advisory boards
- U.S. Fish and Wildlife
- U.S. Forest Service
- Local stream protection group
- NDOT
- Local landowners’ group.

The three subgroups worked together as a multi-disciplinary team. Altogether, the members of this multi-disciplinary team represented the following disciplines:

- Environmental planners
- Landscape architects
- Civil and structural engineers
- Hydraulics and drainage engineers
- Geotechnical engineers
- Surveyors
- Construction managers
- Maintenance and operations engineers
- Traffic analysts
- Revegetation and erosion control scientists
- Right-of-way engineers
- Public involvement staff
- Wind and storm experts
- Lighting designers.

Governing Rules and/or Guidelines

The multi-disciplinary team formed the decision and recommending bodies for the design of the project. Aside from specific design elements, the multi-disciplinary team developed and prioritized the evaluation criteria. Members of the multi-disciplinary team were charged with collaboratively working to solve problems.

Involvement Methodology and Process with Lead Agency

The three subgroups of the multi-disciplinary team worked together on the tasks for Phase I. The SWG had the specific objective of advising the PMT on how to incorporate context-sensitive elements in the initial planning and alternatives

development studies for the project. Additionally, the members of the PMT attended the SWG meetings as needed, based on the particular topics that were on that meeting's agenda. All subgroups met together when project "milestone" decisions needed to be made.

NDOT demonstrated their commitment to the process by involving high-level decision makers on the team and providing specialized training to the members of the SWG. NDOT was rewarded, in turn, with a high level of commitment from the SWG, who recognized that their contributions were reflected in the project outcomes and their priorities were considered by the team members responsible for the high-level project funding and design decisions. The SWG remained virtually intact for the entire process and continues to provide feedback on construction issues.

One key component of the process was to make information and ideas available to all members of the three subgroups. A professional facilitator attended all meetings to ensure the flow of information and help keep the process on track.

The multi-disciplinary team began their dialogue and problem solving on the first day of the project in 1998 and continued integrated project design until final plans were signed. The team met monthly and produced a preferred alignment and basic design within two years. As of the fall of 2006, the SWG had not yet disbanded and continued to meet during the contract bidding process and construction phases of the project.

Team Size and Duration

The multi-disciplinary team was made up of approximately 60 persons, of which 35 to 40 were in the SWG, 5 on the PST, and 15 to 20 on the PMT. Additional staff and consultants joined the PMT to handle short-term project needs. Notably, the SWG remained virtually intact throughout the project development and construction phases.

Integration of Ideas into Project/Program

Ideas generated by the SWG and PMT were evaluated by the entire multi-disciplinary team according to the previously agreed-upon criteria and set of priorities. All of the members of the multi-disciplinary team collaborated on evaluating alternatives and each alternative was evaluated through the use of software programmed with the criteria and priorities.

One of the design choices that resulted from this process was the arch bridge design for the Galena Bridge. The idea of an arched bridge came from members of the SWG, who sensed the community's desire for a landmark structure. The Galena Bridge will be the longest and highest concrete freeway bridge in the state, and will be a unique and dramatic landscape element (see Figure 15).

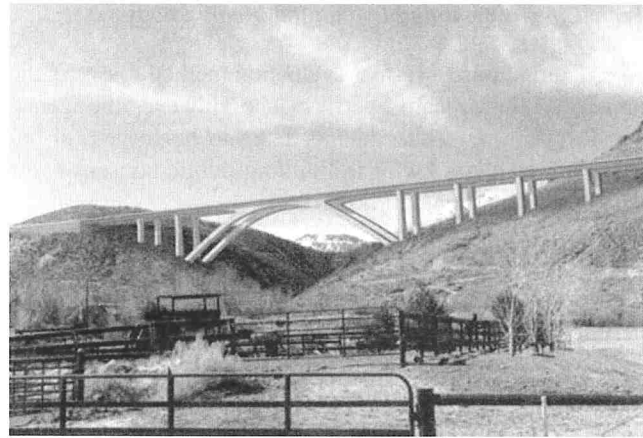


FIGURE 15 Photo simulation of the Galena Bridge. (Source: www.freewayextension.com.)

Integration of community concerns was not limited to design. The SWG has remained intact into the construction phase so that community concerns about construction management can continue to be incorporated into the construction guidelines for the project.

Team Accountability

Each team member was responsible for contributing to the project design. The SWG members were also responsible for representing their constituencies.

Team Performance

NDOT was pleased with the performance of the multi-disciplinary team. As a result, the agency is implementing some of the practices and elements from the I-580 Freeway Extension project in other NDOT projects.

Team Performance and Impact on Project Outcome

The multi-disciplinary team was able to overcome a contentious project history and develop a design that is acceptable to the community, safeguards the environment, and will greatly improve safety and mobility in the area. Some stakeholders who initially opposed the project have changed their position and became project advocates. The contributions of the SWG are reflected in the final project design, most notably in the design for the Galena Bridge. The process was successful in bringing diverse perspectives together and developing a consensus about the project. The support for the project led the governor to identify the project as one of the four highest-priority projects for the state. The facility is currently under construction and expected to be open to the public in 2009.

Team Effectiveness and Evaluation Methodology

NDOT did not use a formal evaluation method to assess the multi-disciplinary team's performance. However, the agency considers the multi-disciplinary team to be successful because it was a key factor in building public consensus for what had been a contentious project.

Members of the team also found the team concept to be effective. As one SWG member stated, "Changes and proposals not only were presented by all involved, but were explained and explored at each phase including engineering, aesthetics, time line, and costs. Everyone truly had a voice in the process and outcomes, either by attendance or through a representative."

Notable Practices

- *Multi-disciplinary teams have a transparent, systematic process in place, which allows team members to see how their input is being used to make project decisions. This includes the presence of sincere feedback loops.* The multi-disciplinary team developed and prioritized evaluation criteria for design alternatives based on concerns voiced by the SWG and the public. A software program was used for the actual evaluation of each design alternative and component.
- *Multi-disciplinary teams exemplify a sense of trust among team members.* Although engaged for design development, the multi-disciplinary team involved a PST concerned with high-level decisions related to funding and other approvals. This displayed a level of commitment on the part of NDOT to the process and the team, which contributed to the development of a high level of trust and commitment among team members.
- *A collaborative process is used that promotes consensus.* Members of the PMT conducted focused meetings to educate SWG members on some of the engineering and technical issues involved in the project. This "professionalization" of the SWG members improved the quality of their design suggestions and helped them participate more fully in the evaluation of alternatives. Collaboration extended to funding decisions as well, through the involvement of high-level decision makers on the PST. Neutral facilitators were used to gain trust among team members and to balance the role of the transportation agency with other interest groups.
- *The multi-disciplinary team has good information-sharing practices.* A project website offers information on the current progress of the project as well as archives of multi-disciplinary team activities, construction photographs, and design alternatives. Computer-generated "fly throughs" were used to help the SWG and the public visualize various design alternatives. The flow of information within the team was enhanced by having an individual who attended all team and subgroup meetings, and who facilitated the exchange of ideas among the three subgroups.

- *The multi-disciplinary team owns the outcome.* The SWG has continued its commitment to the project into the construction phase. Despite complex engineering and construction issues related to the hillside alignment and the Galena Bridge, NDOT has maintained its commitment to the design produced by the multi-disciplinary team. This demonstrates the degree to which the entire team has assumed responsibility and ownership of the final project outcome.

Additional information can be found on the I-580 Freeway Extension Project website: <http://www.freewayextension.com>, and the Nevada DOT's Landscape and Aesthetics Program website: <http://www.ndothighways.org>.

MD-45/YORK ROAD STREETSCAPE, NORTH BALTIMORE AREA, MARYLAND

Maryland State Highway Administration Context-Sensitive Solution Philosophy

The MDSHA defines CSD as a "collaborative, interdisciplinary approach that involves all stakeholders in developing a transportation facility that fits its physical setting and preserves scenic, aesthetic, historic, and environmental resources, while maintaining safety and mobility." Maryland was one of FHWA's CSS pilot states and the host of the first nationally recognized meeting on CSS/CSD. Held at the University of Maryland Conference Center in May 1998, the Thinking Beyond the Pavement workshop was a watershed event during which 325 participants from 39 states and the District of Columbia developed a vision of excellence in highway design for the 21st century. The focus of the workshop was on integrating highway development with communities and the environment while maintaining safety and performance. Participants included chief engineers, senior designers, and planners from 29 state DOTs; representatives of national transportation organizations; and a variety of stakeholders from government, the private sector, and citizens' organizations (20).

Since the 1998 workshop, the MDSHA has worked toward implementing CSD/CSS in policies and processes. Internal teams have been assigned to identify specific needs and develop strategies for implementation in four major areas: organization-wide policies, project development processes, community involvement strategies, and DOT workforce training. Maryland is looked to as a leader in CSS policy and implementation. The MDSHA has continued its role as a national CSS leader, as evidenced in September 2006 when it convened yet another national forum to discuss the evolution of CSS.

Defining the Context

Transportation Need

This urban revitalization project provided streetscape improvements to a 1.6-mile segment of MD-45, also known as

York Road, approximately 5 miles north of downtown Baltimore. MD-45 is a state highway that runs through several communities and is an important connector between Baltimore County and the city of Baltimore, carrying some 35,000 vehicles per day. MD-45 is also a major transit corridor, with two major bus routes operated by the Maryland Transit Administration (MTA) (see Figure 16).

The MDSHA wanted to address poor pavement and sidewalk conditions, outdated signals, and the lack of compliance with Americans with Disabilities Act (ADA) accessibility requirements at pedestrian crossings and transit stops. Local community and business leaders also identified an overall lack of “walkability,” poor drainage, and numerous vacant buildings as major issues (see Figure 17). To address these various deficiencies, the project task force was charged with developing a project concept that would improve pedestrian and vehicular accessibility, promote transit use, generate neighborhood pride, and establish an inviting environment for business.

The project began with the formation of a task force in 2000, and was completed in the spring of 2006, on time and within budget. It was jointly funded by the MDSHA, MTA, and Baltimore County’s Office of Community Conservation. The project was designed by the MDSHA, the City of Baltimore Departments of Public Works and Transportation and Planning, a task force of community and business leaders, and two private consulting firms.

Human Environment

The project area included nine communities (Lake Evesham, Lake Walker, Evesham Park, Bellona–Gittings, Cedarcroft, Schwartz Avenue, Anneslie, Stoneleigh, and Rodgers Forge), two designated historic districts, and an additional area eligible for historic designation. There are two historic sites near the project limits, the thriving Senator Theater and a former toll house for the York Turnpike that had since become dilapidated. The nine communities are well organized and many of them had developed “neighborhood plans.”

Land uses along the corridor are a mix of residential and commercial. Residential areas vary both in type of housing and density. In Baltimore County, Rodgers Forge is a community of higher-density, older townhouses. Anneslie is mostly single family homes with small (one-eighth to one-quarter acre) lots. Stoneleigh consists of single-family homes—all with similar architecture—on one-half to 1 acre lots. Along the portion of the corridor within the city of Baltimore, residences are single-family homes on one-eighth to one-quarter acre lots, as well as an apartment complex for senior citizens.

The commercial area near the city–county line had several vacant properties, including a former department store. In Anneslie, there are one- and two-story commercial businesses along the corridor with the residential area beginning on side roads “behind” the businesses. Several residents noted that they are able to walk to these businesses.

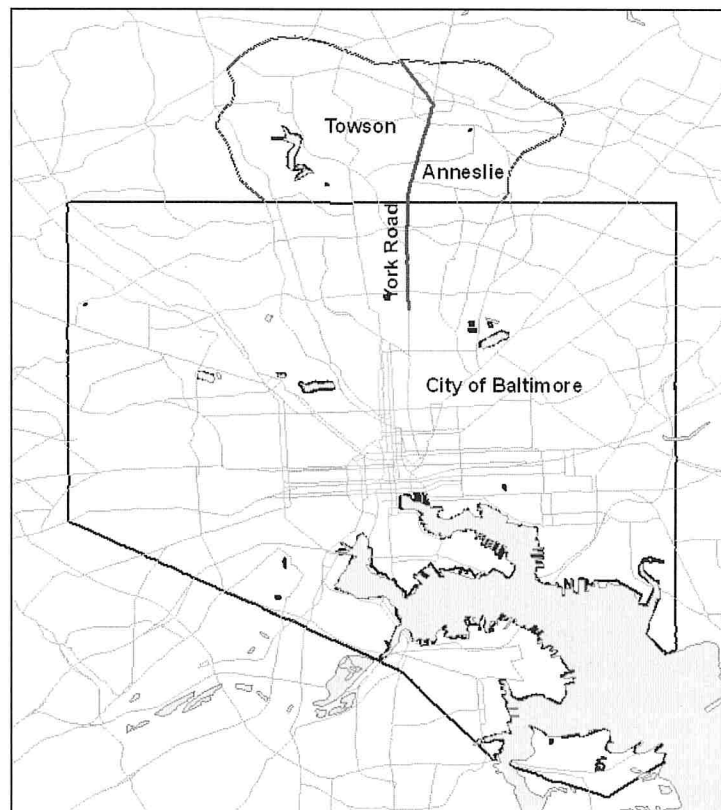


FIGURE 16 MD-45/York Road Project area. (Source: CTE.)



FIGURE 17 MD-45/York Road Project. (Source: MDSHA.)

Natural Environment

The project area is fully developed, although there is some green space in the three “pocket parks” along the corridor. Among of the goals of the project were to add green space wherever possible and to improve stormwater management.

Communities’ Perspective of the Project

The community noted that sidewalks were in poor condition, too narrow in many spots, situated next to traffic, and at some points discontinuous. Street signs and light poles were in the middle of the sidewalk, prohibiting safe passage for pedestrians in wheelchairs or with walkers. Residents also expressed a desire for more opportunities to use transit and other modes of transportation (walking, biking) instead of automobiles. They also desired to reclaim as much green space as possible and asked that construction impacts be kept to a minimum.

Multi-Disciplinary Team

The MDSHA formed a multi-disciplinary team to develop project concepts and goals, and produce the project design. The role of the team was to establish the project goals and work elements, collaborate on how to prioritize the elements (including the construction of said elements), and create a scope of work that fit the project budget. The team sought input from the surrounding community at public meetings. The team also included presenting and building consensus among the other members of the community on the purpose and need for the project.

The team consisted of representatives from state and local government, members of the business community, and community liaisons from each of the nine neighborhoods in

the project area (listed here), with the MDSHA serving as project manager.

- Business operators and managers
- City planners
- Economic development professionals
- Environmental planners
- Highway designers and engineers
- Housing and redevelopment coordinators
- Landscape architects
- Public involvement staff
- Traffic engineers
- Transit planners and managers
- Urban planners.

Governing Rules and/or Guidelines

The task force was organized according to MDSHA policy, which states that the community and agencies collaborate on the development of the project goals, work elements, and design concept as a whole. The “fixed” elements were the project limits and the project budget.

Involvement Methodology and Process with the Lead Agency

The lead agency (MDSHA) served as both the project manager and mediator of the task force meetings. The MDSHA directed the meetings, ensuring that the group reached consensus on the goals of the project before the design process began. The team used a “task force” approach during the concept development, design, and construction of the project.

The team also solicited feedback from the community at the various school fairs, concerts in the park, and other special events that were held within the project area (see Figure 18). The team spoke to “special interest” groups such



FIGURE 18 MDSHA multi-disciplinary team public outreach event. (Source: MDSHA.)

as the elementary school students to gain additional insight into the successes (or shortcomings) of the project.

Team Size and Duration

A typical urban revitalization project may have 20 or 30 task force members; the York Road project had more than 50 and included representatives of the following:

- MDSHA
 - Highway Hydraulics (water resources)
 - Environmental Planning
 - Cultural Resources
 - Traffic
 - Public Outreach
 - Structural Engineer
 - Highway Design
 - Project Development
 - Landscape Architecture
 - District Right-of-Way
 - Utility Coordination and Construction
 - Bike/Pedestrian/ADA coordinators.
- Representatives from the Nine Communities
 - Lake Walker
 - Bellona-Gittings
 - Schwartz Avenue
 - Stoneleigh
 - Rogers Forge
 - Lake Evesham
 - Evesham Park
 - Cedarcroft
 - Anneslie.
- Utility companies
- Baltimore County Office of Community Conservation
- Baltimore County Department of Public Works
- Baltimore City Department of Transportation
- Several businesses along the corridor.

Attendance for the initial task force meeting was approximately 15–20 members. Team membership expanded after initial community outreach to add approximately 10 business owners, a dozen community representatives, utility companies, and representatives from the County Department of Business and Economic Development and the MTA.

The composition of the team changed once the project went to construction. The original team was kept informed of construction progress through e-mail updates, newsletters, and the project web page. During construction, three community liaisons (one representing the neighborhood in the city of Baltimore, one representing the communities in Baltimore County, and one representing local businesses) attended monthly partnering meetings with the MDSHA and the contractor to provide two-way communication between the construction team and the community. The core partner-

ing team at the end of the project included approximately 25 people.

The first task force meeting was in April 2000. The concept development and design team grew from that point, gained public acceptance of the concept in October 2001, and stayed intact through the first weeks of construction in October 2003.

Integration of Ideas into Project/Program

There were two items on the project that were “fixed”: the project budget and the project limits. As the community presented ideas, it was left up to the team to determine if they could feasibly be added to the project scope, and if they could not be added, what palatable alternatives needed to be developed for consideration. If an agency wanted to add work above and beyond the anticipated project scope, the additional work had to be accepted by the community and the agency had to provide an alternate funding source for the work.

Team Accountability

The team was accountable to both the community and the agencies involved. Linking the transportation project with local economic and community development initiatives broadened the membership of the team as well as the interests to which it was accountable.

Team Performance

The MDSHA reports that the team did well, although it fell somewhat behind schedule in preparing the community for construction-related disruption. The multi-disciplinary team focused primarily on the concept development and design process, leaving the construction process as an afterthought until the final months of the design. The team placed strict limitations on when the contractor could work, and as a result, the first bids on the project came in well over the budgeted amount. At a follow-up meeting, the team presented options for maintaining traffic to the community and reducing project cost while minimizing impacts to the community businesses.

The multi-disciplinary team could have reached more members of the community in a timelier fashion if the leaders of all the communities on the multi-disciplinary team had updated their communities through websites and/or newsletters about the project progress. A few community leaders did not follow through on an agreement to link the bi-monthly project newsletter and weekly e-mail updates to their community websites or e-mail the newsletter through to their community’s master list. The MDSHA reports in retrospect that the project manager should probably be responsible for computing the master list for the project and distributing project information from a single point source. The importance of distributing timely information was emphasized because

there was little or no dissent from communities that were well informed.

Overall, the team created a project that not only satisfied the needs and wants of the community, but also served as a model for how these types of projects should function. In 2006, the project received an Honorable Mention in the Project Management Division of the FHWA Excellence in Highway Design Awards Program.

Team Performance and Impact on Project Outcome

The large size of the team helped ensure that all community perspectives were represented and reflected in the project outcome.

Team Effectiveness and Evaluation Methodology

The team distributed comment cards and questionnaires at each meeting to ensure that it was being productive and staying on task with the project goals and elements.

Notable Practices

- *The multi-disciplinary team demonstrated good information-sharing practices.* Multi-disciplinary team members were charged with keeping their constituencies continually informed about the construction process. This aided communication between the community and the contractor during the construction phase, thereby building community trust. Furthermore, innovative public outreach strategies were used to engage and inform the general public of the task force's work through school fairs, concerts in the park, and other special events.
- *Multi-disciplinary teams have a set of ground rules by which they operate to ensure inclusiveness of ideas.* The community had access to the design team to offer suggestions at public meetings and events and other times by directly contacting their representative on the team. The design team worked to develop alternatives that included these suggestions. Agency changes that were above and beyond the anticipated project scope had to be presented to and accepted by the community.
- *Multi-disciplinary teams fully represent the natural and human environment as well as the community's perspective of a good quality of life.* The MDSHA extended participation on the multi-disciplinary team to a large number of stakeholders not usually a part of their project teams, including numerous businesses and economic interest groups, community representatives, and utility companies and transit agencies.

Additional information can be found on the MDSHA website: <http://www.sha.state.md.us>.

SR-12 ESCALANTE TO BOULDER, UTAH

Utah Department of Transportation Context-Sensitive Solution Philosophy

For the Utah DOT (UDOT), CSS is a philosophy that guides planning, designing, constructing, and maintaining safe transportation solutions in harmony with the community and the environment. UDOT uses the following three guiding principles as the framework for its CSS policy:

- Address the Transportation Need.
- Be an Asset to the Community.
- Be Compatible with the Natural and Built Environment.

UDOT seeks to apply these principles in achieving its strategic goals to:

- Take care of what we have,
- Make what we have work better,
- Improve safety, and
- Increase capacity.

UDOT policy also holds that these goals can be achieved through strong interdisciplinary/interagency collaboration and proactive stakeholder involvement throughout the planning, design, construction, and maintenance project phases, a position that supports the use of multi-disciplinary teams.

Defining the Context

Transportation Need

SR-12 is located in south-central Utah. It parallels Calf Creek and the Escalante River and serves Bryce Canyon and Capitol Reef National Parks, the Glen Canyon Recreation Area, several state parks, the Grand Staircase–Escalante National Monument (GSENM), and the Dixie National Forest (see Figure 19). In recognition of its scenic character, SR-12 has

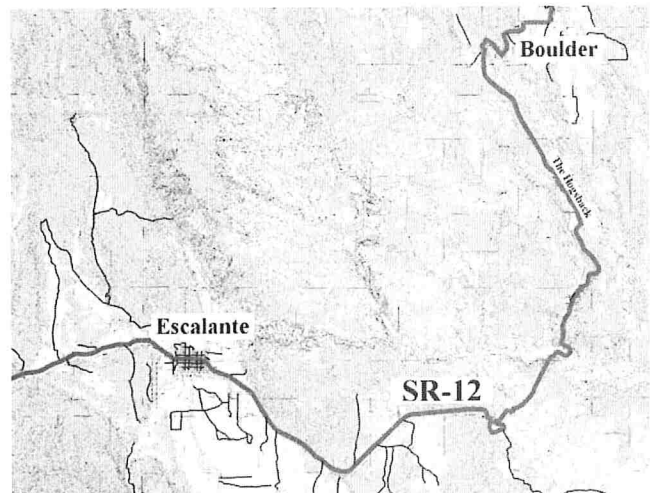


FIGURE 19 SR-12 from Escalante to Boulder, Utah. (Source: UDOT SR-12 project website.)

been designated a Scenic Byway and is one of only 20 All-American Roads in the United States. Following a comprehensive 2002 study of the entire length of SR-12 (and nearby SR-63), UDOT identified a 28-mile segment that needed further assessment. The segment connects the towns of Escalante and Boulder and is located almost entirely within the legislative bounds of the GSENM. It was identified because of safety issues related to roadway geometry, narrow or nonexistent shoulders, animal crossings (cattle and deer), and a mix of very-slow and higher-speed traffic. UDOT also finds maintenance operations along the corridor difficult owing to insufficient right-of-way available for establishing and maintaining clear zones, wash outs of roadway embankments, and a lack of shoulders (see Figure 20).

In 2000, the roadway carried an average daily traffic load of 1,200 vehicles; a mix of commuters, tourists, trucks, and local ranchers/landowners. The mix of users also means a mix of vehicles. For trucks, campers and recreational vehicles, and automobiles that share the highway with bicycles and pedestrians, conflicts between the types of users have contributed to many of the safety and congestion problems in the corridor.

UDOT determined that instead of doing small, individual projects, a comprehensive approach would best serve both the corridor and the surrounding communities. As a result, UDOT structured its work into two phases. The major tasks are listed here.

- Phase I
 - Determine the project purpose and need,
 - Define the project area context,
 - Define project vision,
 - Create evaluation criteria for alternatives, and
 - Conduct evaluation of alternatives.
- Phase II
 - Conduct evaluation of alternatives and
 - Provide recommendations.



FIGURE 20 Lack of shoulders and washouts along SR-12 project corridor. (Source: UDOT SR-12 project website.)

Phase I began in August 2004 and was completed in April 2006. Phase II includes the formal environmental assessment process and is scheduled to be completed in late spring of 2007, when the draft environmental document will be available for formal public comment.

Human Environment

The segment of SR-12 from Escalante to Boulder runs through an area of unique natural landscapes, shaped by Native American civilizations, Western history, and pioneer culture. Traces of three major prehistoric Indian cultures—the Sevier, Fremont, and Anasazi—have been found throughout Garfield County. In historic times, Southern Paiutes and Utes used the land. The region was later settled by ranchers who raised sheep, cattle, and horses. Today, although ranching remains an important economic activity, the communities along SR-12 also depend heavily on tourism.

Natural Environment

The GSENM is known for its dramatic geologic formations, as well as unique paleontological and biological resources. The corridor is renowned for its extraordinary vistas, some of which have been mapped for protection under a 2002 corridor management plan (see Figure 21). Maintaining diverse native plant communities is one of the key goals for the GSENM, which requires close attention to controlling invasive species. Various resource agencies have identified a number of mammal, reptile, and avian species as having special management status. Although deer are not included in that list, the corridor has several zones where deer crossing the highway pose a hazard.

Portions of the Escalante River and Calf Creek have been protected for potential inclusion in the National Wild and Scenic River System. Calf Creek has also been documented to need water quality improvement measures to reduce sediment and total dissolved solids; therefore, proposals for corridor improvements needed to include careful consideration of runoff and washouts.

Community's Perspective of the Project

The surrounding communities' perspective of the project varied greatly based on personal needs and experiences. Initially, community team member comments ranged from "make it a four-lane highway" to "don't change a thing." A list of more than 400 suggested improvements was compiled, reflecting the diversity of opinions and perspectives on the project. As the project progressed, the project team and the interested communities developed a more focused understanding of the transportation need, and community concerns also became more focused; any improvements needed to be minimal and had to be aesthetically pleasing.

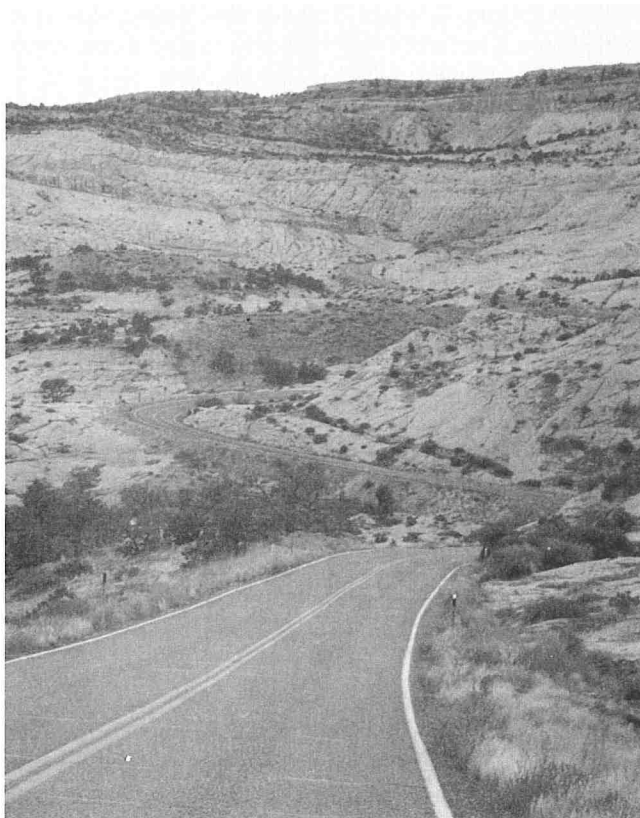


FIGURE 21 Portion of SR-12. (Source: UDOT SR-12 project website.)

Multi-Disciplinary Team

UDOT convened a multi-disciplinary team to assist in Phase I of the project. The project team, in consultation with citizens who were active in local community issues, identified key stakeholders whose interests reflected the various concerns along this segment of SR-12. An invitation to participate in the Context Sensitive Committee (CSC) was extended to these key stakeholders.

The mission of the CSC was to raise and address issues that should be considered in the planning, environmental, and engineering studies along the corridor. The CSC also served to help develop partnerships with key stakeholders willing to collaborate with UDOT on the project study documents. CSC members provided valuable input for defining the context of the project area and assisted the SR-12 project team with the development of alternatives for project solutions. The committee served in an advisory role to UDOT and FHWA to bring context-sensitive elements early in the initial planning and alternative development studies of the project. The goal was to achieve the mission of CSS, with the CSC members providing input, comments, and recommendations to the project team at major milestones of the project (see Figure 22).

CSC membership is listed here.

- Bicycle community representative

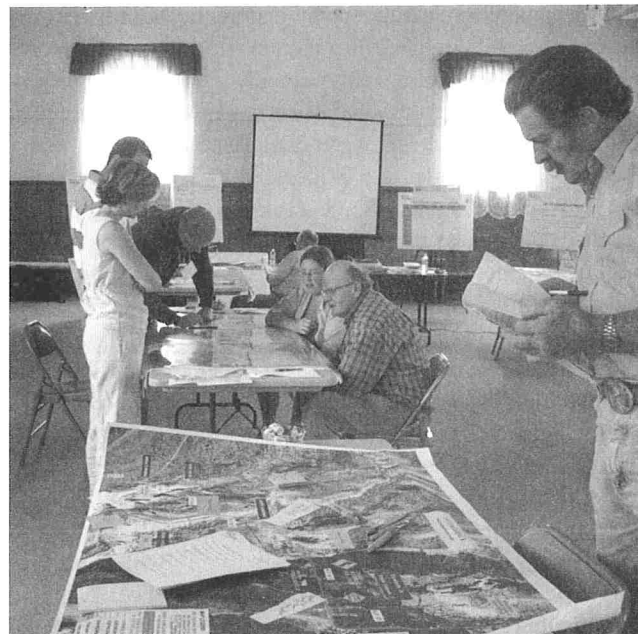


FIGURE 22 The CSC at work. (Source: UDOT SR-12 project website.)

- Boulder City Council representative
- Escalante/Boulder Chamber of Commerce
- Escalante City Council and UPS driver representative
- FHWA
- Garfield County School District (school bus driver)
- Garfield County Commissioner and Ranching
- Garfield County Travel Council representative
- Southern Utah Wilderness Alliance representative
- U.S. Bureau of Land Management and GSENM
- UDOT
- Wild Utah Project representative.

The disciplines represented on the team are listed here.

- Bicyclists,
- Biological resource experts,
- Constructability experts,
- Cultural resource experts,
- Engineers,
- Environmental community representatives,
- Landscape architects,
- Local government representatives,
- Local photographer,
- Local writer,
- NEPA experts,
- Public involvement experts,
- Ranchers, and
- Right-of-way specialists.

The membership of the multi-disciplinary team was completed with representatives from local governments, other resource agencies, and transportation professionals from UDOT and several consulting firms who also served on the

project team. The project team provided information from project studies to the CSC to assist with implementing the committee's mission and goals. Examples of the information provided included legal and regulatory issues, alternative development, CSS, landscaping, visual and constructability issues, transportation engineering, and transportation maintenance.

A project team member described the team members as providing "mutual education" to one another. This was especially the case during one meeting where the FHWA and UDOT representatives described the weighty responsibility of designing a safe facility to the other members of the CSC. The face-to-face dialogue about the obligations that go along with placing an engineer's stamp on a set of drawings as the reason behind many design decisions was a significant moment that brought the team together in discussions of roadway safety and design.

Members of the UDOT project team served as facilitators for the process. To alleviate concerns among the CSC members about this arrangement, the team met individually with each CSC member at the start, asking if they had concerns about conflicts of interest that could arise from this arrangement. The CSC found this arrangement acceptable. Additionally, the project team assured the CSC that the team facilitators would be replaced if, in the view of the CSC, the arrangement became problematic.

Governing Rules and/or Guidelines

A charter was developed identifying the mission, goals, responsibilities, and meeting commitments and was signed by each member of the CSC.

We the undersigned agree to work within the initiative of this Committee to assist the Project Team with incorporating a context sensitive approach into the planning, environmental, and engineering studies needed to implement safety improvements along SR-12 from Escalante to Boulder. We agree to follow the Committee established ground rules, promote teamwork, and actively seek to achieve the goals as stated above. We further agree that, with consensus among the members, the initiative, mission, and goals of this Charter are flexible and can be modified and/or amended to meet unforeseen Committee objectives.

Committee meetings occurred at regular intervals to review project information, provide pertinent comments on project studies, and participate in the major study milestones.

The following ground rules were set at the first meeting:

- Take turns speaking and respect others when they are talking;
- Recognize that, even if we do not agree with it, each of us is entitled to our own perspective;
- Request a break when we need to; and
- Share any comments with the entire committee.

Involvement Methodology and Process with Lead Agency

The CSC strived to obtain a consensus among members on recommendations before presenting them to the project team, which considered all input from the committee. As a strategy to ensure that all committee members remained engaged throughout the project, a member had a personal meeting with facilitators and/or project team members if they were unable to attend a meeting, received all meeting materials, and had the opportunity to add their comments to the meeting outcomes.

Team Size and Duration

There are 12 members of the CSC. The size of the project team has varied somewhat depending on the specific needs at each point in the process (see Figure 23).

The CSC will continue to work with the project team into Phase II. The continued involvement of this diverse group of stakeholders will ensure that the SR-12 environmental study better reflect the context of the project. The responsibilities of the committee will terminate after the comment period on the final environmental document is completed.

Integration of Ideas into the Project/Program

One of the initial tasks for the team was to reduce the number of suggested improvements, which started at more than 400 options, to a manageable number. The project team worked through the suggestions, combining similar options and reorganizing the list for presentation to the CSC. The CSC developed a list of evaluation criteria and each option in the reorganized list was evaluated using those criteria. The options that best satisfied the criteria became the options on which the CSC focused the rest of its work. This process was time-consuming, but laid a foundation for building consensus for later decisions.

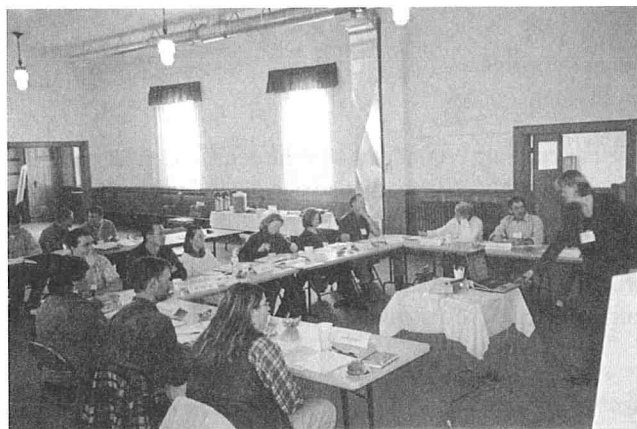


FIGURE 23 SR-12 Escalante to Boulder, Utah, CSC project team. (Source: UDOT SR-12 project website.)

Agendas and minutes were prepared by the facilitator, distributed to all CSC members, and included as part of the official Project Administrative Record.

The project team used the input from the CSC to create a Needs Assessment (Extended Purpose and Need), Context-Sensitive Evaluation Criteria, and a Conceptual Alternatives Report Phase I. The committee reviewed the documentation for the needs report and provided feedback. Each of the alternatives was presented to gain feedback from the team.

This information was also presented to the general public at meetings; everything created by the committee and the project team is commented on by the public. In turn, the comments from the public are shared with the committee. This feedback loop connects the public input with the material created by the multi-disciplinary team.

Team Accountability

The CSC was accountable to the project team by providing them with the necessary knowledge of community interests and needs. They were also accountable to the stakeholders whom they represented. It was their responsibility to pass their respective groups' comments, issues, and questions to the project team. For Phase I, the entire multi-disciplinary team (the CSC and the project team) was responsible for producing a solid foundation for the formal environmental review process.

Team Performance

The multi-disciplinary team provided invaluable information to the project team that will be included in the environmental study. A multi-disciplinary approach that centered its mission around the concepts of CSS for both process and product helped UDOT get the environmental study work for a potentially volatile project off to a positive start. Project team members anticipated that building working relationships with stakeholders at this early stage will help avoid delays and challenges later.

Team Performance and Impact on Project Outcome

The project team is confident that the decisions made and documented for Phase I clearly and accurately reflect the values, visions, and characteristics of the multi-disciplinary team and in turn reflect the wishes of the nearby communities. Decisions produced without the input of this group may not have accurately reflected the stakeholder's visions for the corridor.

Team Effectiveness and Evaluation Methodology

UDOT did not formally evaluate the performance of the multi-disciplinary team. However, UDOT did provide the CSC with

an opportunity to assess the process. CSC members had many positive comments about the process and stated they would like to continue to be involved with the project. Some of the comments from committee members are noted here:

- "The Committee has developed a relationship that allows them to come together and voice different opinions."
- "Meeting together as a group is useful and allows the Committee to discuss specifics together."
- "I am heartened by the outcome of the Committee meetings and think it will lead to a better result down the road."

Some UDOT staff reported that the multi-disciplinary team's performance could be improved by accelerating the process. The early processes of establishing evaluation criteria and evaluating the initial project options were specifically mentioned as proceeding slowly. Accelerating these early processes, however, would likely be counterproductive, especially for a volatile project. Developing consensus on final recommendations fundamentally depends on consensus at previous points. The SR-12 experience points up the importance of allowing enough time at the early stages to head off controversy over later decisions. When the formal environmental studies are released, the degree to which the multi-disciplinary team for the SR-12 project was successful will be more fully assessed.

Notable Practices

- *Multi-disciplinary teams fully represent the natural and human environment as well as the community's perspective of a good quality of life.* The CSC represented community interests and needs such as bicycling, Chamber of Commerce, school district (school bus driver), and the Southern Utah Wilderness Alliance. Membership included not only residents and landowners along the corridor but also the interests of corridor users who live elsewhere, an often overlooked group. A project team member described the perspectives represented in the composition of the team as a "360 degree circle," with each perspective counterbalanced by another. Therefore "everyone had to come into the circle to find something that works."
- *Multi-disciplinary teams have a set of ground rules by which they operate to ensure inclusiveness of ideas.* The committee developed a common mission statement and a charter to establish a framework for roles and responsibilities. Committee members agreed to a set of ground rules for meetings that encouraged a respectful exchange.
- *Multi-disciplinary teams are consulted early in the decision-making process before purpose and need, and scoping.* UDOT convened a multi-disciplinary team at a very early point in the process, with the goal of launching the formal environmental review process after extensive work with the stakeholders. This will likely prove a wise choice given the volatility of the project and the potential for controversy. More impor-

tantly it will help ensure that from the beginning proposed project alternatives will respect and respond to the project's context.

- *A collaborative process is used that promotes consensus.* The process included early and ongoing interaction between the CSC and the project team, which was combined with public outreach. Sufficient time was given to early processes so that team members believed that all perspectives had been heard and considered. As one team member stated, "The members of the team are well respected and are members of the community. This has created a level of trust that cannot be quantified, but defines the success of the use of a multi-disciplinary team in a project process."

Additional information can be found at the UDOT CSS website: <http://www.udot.utah.gov/index.php/m=c/tid=144>, UDOT SR-12 project website: <http://216.146.224.185/sr%2D12/>, and Grand Staircase Escalante National Monument website: <http://www.ut.blm.gov/monument/>.

EFFICIENT TRANSPORTATION DECISION-MAKING PROGRAM, FLORIDA

Florida Department of Transportation Context-Sensitive Solution Philosophy

In 1998, FDOT adopted a policy called Transportation Design for Livable Communities (TDLC) that complies with the concepts and principles of CSS. This policy is also closely linked to the community impact assessment (CIA) process. A CIA provides extensive information on the context of projects, the perspectives of the community, and the anticipated effects of any transportation action on communities and their quality of life. FDOT policy states that the following areas are important components of quality of life and should be evaluated during a CIA:

- The safety of all categories of transportation system users;
- Efficient use of energy;
- Protection of the natural and manmade environment;
- Relationships and coordination between land use and transportation planning;
- Local and state economic development goals;
- Complementing and enhancing existing standards, systems, and processes; and
- Social factors including location and displacement, civil rights, and economic changes.

Florida has implemented a number of programs to improve the way it addresses these factors, not only in project design, but in the entire transportation decision-making process. For example, FDOT has developed guidelines for public involvement, project screening (environmental and social and cultural effects), and for collaborative arrangements with permitting agencies.

Defining the Context

Transportation Program Need

As with many places, in Florida the transportation planning process begins when MPOs and FDOT identify mobility needs. At the metropolitan level, project needs are matched to available funding for projects in the MPO Long-Range Transportation Planning process. Similarly, at the state level, FDOT develops cost-feasible plans for the highway system and the state's bridges. Priority projects are selected annually from these cost-feasible plans and are presented to the Florida legislature as the tentative, five-year Work Program. Once the legislature approves the Work Program, included projects may wait for funding for up to five years before significant work proceeds. At that point, the Project Development and Engineering (PD&E) process begins, design survey work is carried out, and interaction between permitting agencies is initiated. The PD&E process is followed by the project design phase. In the past, many of Florida's permitting agencies would wait for the submittal of a permit application before expending significant effort in project review. This would typically occur at about the 60% level of detail in the design phase.

A number of problems developed in connection with this long and complex process:

- Long-time gaps occurred between some steps.
- Planning information was often obsolete before PD&E began.
- Community concerns elicited during planning were not effectively communicated to designers.
- Agency involvement occurred late in the process, after substantial work was performed.
- Momentum for delivery of the project discouraged significant design changes, especially late in the process

The Rose Bay Bridge in Port Orange, Florida, provides an example of the problems associated with the traditional decision-making framework (21). The original Rose Bay Bridge had been constructed partially on a causeway that restricted natural water flows between the Halifax River and the Volusia County Bay. In the 1990s, the bridge was deemed obsolete and was scheduled for replacement. The project was designed and permit applications were submitted to resource agencies. The final permit for the project was denied based on water quality concerns, and FDOT was required to redesign the project. The redesigned, successfully permitted and built bridge spans the entire waterway, thus restoring the natural flow patterns between the river and the bay (see Figure 24). Late agency involvement in the project translated into substantial delay and resulted in higher total costs.

Recognizing that the entire process needed to be revised, Florida took advantage of the provisions of the Transportation Equity Act for the 21st Century (TEA-21), the federal



FIGURE 24 Completed Rose Bay Bridge. (Source: FDOT.)

transportation legislation passed in 1999. TEA-21 had a number of objectives related to process improvement:

- Effective and timely decision making without compromising environmental quality,
- Integrated review and permitting processes,
- Early NEPA reviews and approvals,
- Full and early participation, and
- Meaningful dispute resolution.

These TEA-21 provisions were in response to concerns often raised by citizens about the amount of time it takes to implement a transportation project. In addition, time lags between need identification, environmental studies, and permit applications often resulted in significant changes in the project area, which translated into inaccurate or incomplete project studies.

The Central Environmental Management Office of FDOT took the initiative to reexamine FDOT's entire process from

the very early stages of planning through project development and permitting. A vision statement was developed at one of the early working group meetings.

It is our vision to improve transportation decision making in a way that protects our natural and human environmental resources. It is our goal that we, as environmental resource and transportation agencies, establish a systematic approach that integrates land use, social, economic, environmental, and transportation considerations. This approach will include the active participation of Federal, State and Local agencies, and the public. It will lead to decisions that provide the highest quality of life and an optimal level of mobility for the public we serve (22).

The revamped process is known as Efficient Transportation Decision Making (ETDM) (see Figure 25). The ETDM process seeks to give equal emphasis to the human environment and the natural environment. Meeting this goal requires interaction among agencies and the public. In turn, these interactions require substantial coordination of data, which needs to be available to all stakeholders. Therefore, along with policies requiring interagency cooperation, one of the major components of ETDM is an Internet-accessible, interactive database called the Environmental Screening Tool (EST). EST delivers the data needed for making balanced decisions.

Human and Natural Environment

The elements of the human and natural environment are integrated into ETDM through the EST, as well as information and perspectives gathered during the public outreach process. Florida maintains a centralized geospatial data library so that all resource data are available in a common format and are accessible to all the agencies that work with FDOT. Each agency is responsible for keeping their data up to date. In fall of 2006, the library reported that it held more than 350 layers of GIS data including agricultural data, aerial photography,

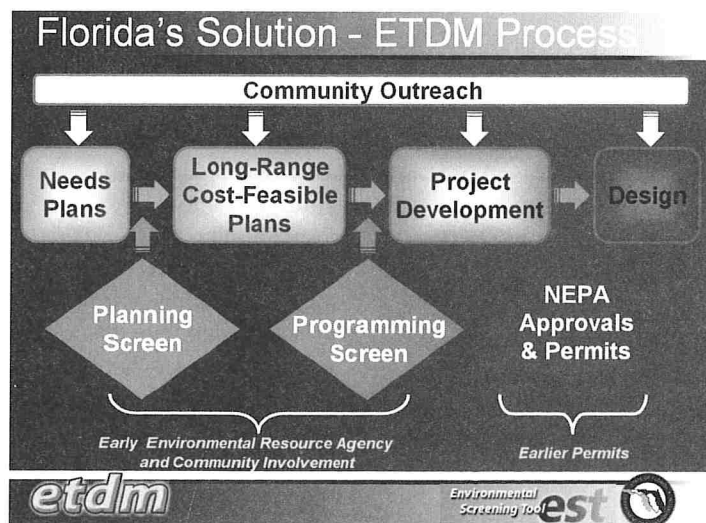


FIGURE 25 Florida's ETDM process. (Source: <http://www.ncdot.org/doh/preconstruct/highway/geotech/trb/download/presentations/4b/01%20Florida%20ETDM.pdf>.)

political boundaries, cultural data, habitat data, hazards, satellite imagery, geologic and topographic data, planning data, tax and property data, transportation corridors, and U.S. Geological Survey quad map data. New data files are added as they become available. A parallel website makes the same GIS data available to the general public.

Community and Agency Perspectives

The working group charged with redesigning FDOT processes identified early agency involvement as a key component for increasing overall efficiency. Therefore, the ETDM process provides opportunities during planning and programming for stakeholder agencies to review potential projects. In addition to these agency reviews, the process includes public outreach at multiple points, coordinated by a public outreach specialist.

The “Planning Screen” occurs in conjunction with the development of cost-feasible plans. Project needs are reviewed by agencies that provide information to project planners about the effect that a planned project would have on resources protected or managed by that agency. In urban areas, MPOs provide input about the effect of a project on the community. FDOT provides input about community or sociocultural effects for projects on the Florida Intrastate Highway System and projects in non-MPO areas of the state. At this early stage of planning, the information provided by agencies helps identify project configurations that would avoid or minimize adverse effects on Florida’s natural or human environments.

In the case of known unavoidable effects, agencies provide commentary on suggested mitigation measures. This information is used by project planners to adjust project cost estimates, and in some cases adverse effects that substantially affect costs may change the project’s priority. Some projects might not advance owing to adverse effects. The interaction between agencies, FDOT, and the public during the planning screen provides guidance and recommendations during early phases of project development.

The “Programming Screen” occurs before projects are considered for the FDOT Work Program. During the Programming Screen more specific information is developed that affects the scope of work to be performed during project development. Agency input during the Programming Screen is more detailed. At this point, agencies provide specific information to identify technical issues that must be addressed by engineers and planners during the project development phase. Agency input during the Programming Screen comprises the NEPA scope of work—the environmental technical work needed to satisfy that agency’s statutory responsibility. Areas that may require mitigation are identified as are any needed technical studies, permits, and permit conditions. This input by the agencies can be used by FDOT to develop a specific scope of work to be done during project development.

In some cases, agencies will make a finding that a technical factor is not an issue for a project. This allows FDOT to remove that item from the project development scope of work and focus subsequent engineering and planning work on key technical issues that must be addressed. FDOT anticipates that this will eliminate unnecessary or repetitive technical work and lead to reductions in costs.

Multi-Disciplinary Team

FDOT has a decentralized organizational structure, with the state divided into seven geographic districts. Each district has an Environmental Technical Advisory Team (ETAT) consisting of representatives from agencies that have statutory responsibility for issuing permits or conducting consultation under NEPA.

- FHWA
- FTA
- U.S. Army Corp of Engineers
- U.S. Coast Guard
- EPA
- U.S. Department of Agriculture Natural Resources Conservation Service
- U.S. Fish & Wildlife Service
- U.S. Forest Service
- National Marine Fisheries Service
- National Park Service
- Seminole Tribe
- Miccosukee Tribe
- Florida county governments
- MPOs
- Florida Department of Environmental Protection
- Florida Department of Community Affairs
- FDOT
- Florida Department of Agriculture and Consumer Services
- Florida Fish and Wildlife Conservation Commission
- Northwest Florida Water Management District
- South Florida Water Management District.

The district’s ETAT is responsible for interacting with FDOT and with MPOs throughout the ETDM process. Each district and MPO has designated an ETDM coordinator, who has the responsibility for interacting with agency ETAT representatives and also for coordinating activities within the district. Districts and MPOs also have Community Liaison Coordinators (CLCs), who are assigned the responsibility for interaction with affected communities and for establishing a two-way conduit of communication about project plans.

The ETAT identifies avoidance and minimization issues, and the CLC works with communities to address issues and requests regarding CSD. The intent is that there are no “surprises” late in the process (e.g., requests for another scope of

work, changes in permit conditions, permit denials, community concerns, or disapproval).

Governing Rules and/or Guidelines

FDOT has developed detailed guidelines for the composition, function, and responsibilities of ETATs. The guidelines are designed to establish a more transparent process, based on shared data, which will allow team members to come to a consensus on specific projects.

The team ultimately assists with the determination of whether a project is viable and should move forward. If a project moves forward the team's input determines the scope and level of NEPA documentation, as well as which alternative becomes the preferred alternative.

Team Size and Duration

Most ETATs have 20 members. However, team size may increase as more agencies sign agreements and become a part of the process; for instance, when work affects a Florida military installation, a military representative is added to the ETAT. The following is a list of disciplines and stakeholder interests represented on ETATs.

- Wildlife and habitat specialists
- Water quality
- Aquaculture
- Environmental contamination
- Soils
- Horticultural
- Transportation planners
- Urban and regional planners
- Permit coordinators
- Community planners
- Archaeologists
- Engineers
 - Structural
 - Environmental
 - Transportation
 - Geotechnical
 - Bridge
 - Civil.

ETATs are permanent entities and are convened under 5-year agreements with FDOT. There is an established process for renewing or changing individual team members.

Integration of Ideas into the Project/Program

In the ETDM process, project development is a collaborative effort from beginning to end. In addition, the ETDM process itself is open to adjustment. FDOT includes numerous feedback loops in the process through ETAT meetings to identify

and address areas where improvement to the process may be needed.

Involvement Methodology and Process with Lead Agency

The lead agency is a part of the ETAT; therefore, each agency has complete input into the work of the lead agency throughout the entire process. Only one ETAT member from each resource or regulatory agency can speak officially for that agency over the projects in the respective FDOT district. Other agency representatives have access to the EST in a "read only" capacity and they may submit comments to ETAT members. The ETAT members have 45 days to submit an official agency response in the EST, with some provisions for time extensions. Comments are considered draft and can be updated until the 45 day period is complete. At the end of the 45 days, all comments in the database become the official agency position. If no comments are received, the database notes this as well.

The Planning and Programming Screens are independent reviews. In other words, if an agency did not have concerns in the first review, it may still identify concerns in the subsequent review. All interactions (responses and outcomes) are documents in the project summary reports developed following each screen. These reports are available to everyone, including the ETAT, project planners, and the public. All technical studies and draft and final environmental documents are also made available to the ETAT.

Team Accountability

Each member is held accountable to the ETDM program and to FDOT through interagency operating agreements and the design of the process. In addition, each ETAT member is expected to provide their agency's data layers and make sure all data are regularly updated. Any data issues are the responsibility of the agency that provided the data. ETAT members are expected to attend all meetings, joint application sessions, etc. ETAT members act as the agency contact should any issues or disputes arise.

Team Performance

FDOT is pleased with the positive performance of the ETATs. FDOT now has access to valuable information on which to base decisions about project funding priorities and the levels of project documentation needed. FDOT is already realizing benefits from shortened time frames. For example, after Hurricane Ivan in 2004, a series of bridges on I-10 needed replacement (23). The EST provided a framework for quickly distributing project information and collecting agency responses. Having an established team in place allowed meetings to be coordinated on shorter notice. The

PD&E process for the bridges was complete in 15 weeks, compared with the typical 18 to 24 months for similar projects. Other realized benefits have included verification of available GIS data by agencies and making more high-quality data available to FDOT and MPOs.

Team Performance and Impact on Project Outcome

The ETAT is directly involved in project outcomes. The multi-disciplinary ETAT has a direct impact on the feasibility determination of a project, the selection of the preferred alternative, and the scope of the project, including the level of environmental documentation required. ETATs and the entire ETDM program are also bringing greater efficiency because of overall time savings and better allocation of human and financial resources.

Involving ETAT from the beginning means that team members have reviewed project information and provided input on the environmental issues before the NEPA process begins. Previously, many reviewers and permitting agencies were not involved until project development was well underway. Reviews are being conducted in much less time and, in many cases, concurrence is discussed or even decided in advance of when it is needed.

Aside from time savings, FDOT is also seeing that cost estimates for later phases are much closer to actual costs. The early involvement of all parties removes uncertainty about what will be required during the later phases of NEPA work, which helps FDOT more efficiently allocate resources.

The ETDM program also helps ensure less waste in the work produced by staff. For example, work products generated during the PD&E phase can be carried forward into the project design phase. The design process as a whole also proceeds more smoothly when specific engineering issues, such as right-of-way acquisition, detention pond location and design, access management, and wildlife crossings, are resolved during the NEPA process.

Team Effectiveness and Evaluation Methodology

Although to date only one project has moved through the entire ETDM process, FDOT is already recognizing some of the benefits from using a multi-disciplinary team in the ETDM program. As more projects move through the process, FDOT will have a large enough number of projects to quantify the benefits of the ETDM program.

FDOT has developed a Performance Management System to evaluate ETATs using multiple measures to gauge team performance. This system tracks the numbers of comments received, whether they were received on time or agencies

requested time extensions, and whether agencies responded to all issues on all alternatives of a project. The system generates reports of all comments and degrees of effect. This report is sent monthly by e-mail to each agency, with a quarterly and annual joint review. Reports can also be generated per month, quarter, year, or customized period.

ETDM Coordinators and Central Environmental Management staff also review the quality of the agency comments received. They determine whether or not the comments provide sufficient detail to the FDOT project managers for the development of project scopes. Quarterly and again annually, the agencies provide FDOT with feedback on the teams, processes, EST, and project information provided for their review. They identify opportunities for improvements, as well as identify issues with existing process or supporting technology implementations.

To date, at the programmatic level the overall effectiveness of the ETDM process has not been evaluated systematically because the ETDM is still relatively new. However, preliminary evaluations of the district's ETDM pilot project (SR-15/600/US-17/92 in Seminole County) indicate that projects produced using ETDM processes and principles from the start have had greater clarity in defining the scope of work. This has led to upfront time and cost savings, avoiding duplication of work in later phases or detailed investigations of issues that are not applicable to the project. This pilot project is also projected to have a significantly reduced time frame for delivery of between 12 to 18 months, compared with a typical time frame of 18 to 24 months. The time savings are being attributed to several elements of the ETDM process.

- More agency information and involvement before NEPA/PD&E (e.g., level of impacts and agency buy-in) have allowed FDOT staff and the project team to allocate time and resources more efficiently and complete their jobs more quickly.
- Because the ETAT team was already aware of the project, had reviewed the project information, and had provided input on the environmental issues before the NEPA/PD&E phase, the project team secured reviews and agency concurrence far in advance of permitting.
- As the work products generated in PD&E are the actual design files for the 30% plans and aerials are being used for public workshops and hearings, there is less waste and duplication in early work effort.
- Right-of-way acquisition, maintenance responsibilities, access management, and utility coordination were started earlier, which led to more complete and accurate cost estimates for later phases.
- Unique enhancements settled on during the NEPA process were incorporated into the design concept from day one rather than added in later, or perhaps even too late for inclusion.

The full design survey was completed during NEPA, which allowed actual design plans to start three months sooner than would be typical for similar projects.

Notable Practices

- *Multi-disciplinary teams fully represent the natural and human environment, as well as the community's perspective of a good quality of life.* ETATs include representatives with knowledge and expertise in all areas related to transportation facilities. The program is flexible enough, however, to allow for the addition of team members, if needed, for particular districts or projects. A CLC on each team also provides a link to community concerns that may not be specifically represented by ETAT members.
- *Multi-disciplinary teams are consulted early in the decision-making process before purpose and need and scoping.* ETDM is a programmatic approach to establishing multi-disciplinary teams very early in the process and continuing their involvement through project development.
- *Multi-disciplinary teams have a set of ground rules by which they operate to ensure inclusiveness of ideas.* ETAT operating agreements ensure that roles, responsibilities, and expectations are clear and are applied with consistency across the entire state. The extensive guidance for ETAT operation allows all ETAT members and the public to better understand the process and the subsequent outcomes. This transparency will also contribute to an attitude of trust and collaboration that will promote inclusiveness.
- *Multi-disciplinary teams have a transparent, systematic process in place that allows team members to see how their input is being used to make project decisions. This includes the presence of sincere feedback loops.* The web-based EST allows all ETAT members to track the process and access all members' input. The decoupling of the planning screen from the programming screen operates as a feedback loop, allowing team members to change their comments if necessary to respond to changing project contexts. This arrangement also encourages early agency participation by not locking agencies into a position taken at the initial planning phase.
- *The multi-disciplinary team has good information-sharing practices.* The EST provides a platform for disseminating information through an on-line database that enables all team members to see the same information. The on-line screening tool allows feedback loops where comments and questions can be viewed by all team members. The public access area of the EST is available to the general public and can be used as a basis for public outreach efforts and presentations at public meetings. The ETDM program also includes sharing information about the performance of the ETAT itself. Information on team performance is collected through

questionnaires, at ETAT meetings, and through quarterly reports from agency representatives.

Additional information can be found at the Florida Department of Transportation–Environmental Streamlining home page: <http://fdotenvironmentalstreamlining.urs-tally.com/>, Florida Department of Transportation–FDOT Efficient Transportation Decision Making: <http://www.dot.state.fl.us/emo/ETDM.htm>, and Florida Department of Transportation–Efficient Transportation Decision Making Public Access Site: <http://etdmpub.fla-etat.org/>.

SUMMARY OF LESSONS LEARNED

The case studies point up several specific practices that can be transferred to other state DOTs and are especially promising for helping mainstream CSS into transportation decision making.

- Establish a multi-disciplinary team early enough in the process to have it involved in developing the project purpose and need to ensure that the project outcome will truly reflect the context.
- Convene a fully representative team, including external stakeholders and members of the community, so that project context can be fully understood and reflected in project outcomes.
- Bring the multi-disciplinary team into the decision-making process so that the project outcomes are genuinely an asset to the community in addition to meeting the transportation need.
- Time spent wisely upfront on understanding contextual elements and stakeholders' issues and concerns can save money and time on project delivery.

Because the survey results revealed that most state DOTs are using multi-disciplinary teams in some form (see chapter two), the case studies can disclose areas where practice can be revised to make multi-disciplinary teams an even more effective part of achieving CSS. Taken together, the four case studies presented in this chapter highlight some basic tenets that DOTs should keep in mind when using multi-disciplinary teams.

- Gain consensus on the vision, objectives, and ground rules for the multi-disciplinary team at the outset.
- Establish a robust, on-going connection between the multi-disciplinary team and the public.
- Empower the multi-disciplinary team to provide more meaningful input by providing specialized training on technical and procedural issues.
- Demonstrate commitment to the team by responding to their input and connecting them with high-level decision makers.
- Build flexibility into the process, whether the team is operating at the programmatic or project level, and be

open to adding team members as needed to reflect contextual elements and stakeholder issues.

- Make continuity of the team a priority to build trust among team members and continue to address project/program contexts through project delivery and beyond.
- Implement a good information sharing and dissemination process to promote transparent, collaborative decision making.
- Use facilitators to manage team expectations, enforce roles and responsibilities, and build consensus.

CONCLUSIONS

Although transportation agencies use different terms to characterize the principles and philosophy of context-sensitive solutions (CSS), the underlying theme is one of developing transportation solutions that improve the quality of life for the communities being served by transportation agencies. The CSS philosophy has continued to evolve over the last 10 years; however, the inclusion of multiple perspectives and disciplines in the decision-making process has remained a fundamental principle in defining CSS. The CSS approach to transportation decision making suggests that multi-disciplinary teams:

- Fully represent the natural and human context as well as the community's perspective of a good quality of life.
- Have a set of ground rules by which they operate to ensure inclusiveness of ideas.
- Have a transparent, systematic process in place that allows team members to review how their input is being used to make project decisions. This includes the presence of sincere feedback loops.
- Promote an atmosphere of collaboration that strives toward consensus.
- Exemplify a sense of trust among team members.
- Provide ownership of the outcome.
- Use good information-sharing practices.

A review of current practices and literature related to using multi-disciplinary teams to reach CSS for transportation projects found only a few publications, guidelines, and examples. The survey results provided insight into understanding state departments of transportation (DOTs) perceptions about CSS and multi-disciplinary teams.

The survey revealed the following CSS policies, guidance, and directives related to multi-disciplinary teams by state DOTs:

- A majority of the states surveyed have an adopted CSS policy and almost half (47%) have guidelines for using CSS.
- Most states are using internal multi-disciplinary teams as a CSS application. If external team members are accepted on the teams, they most often come from federal and state agencies.
- Most states have offered some type of CSS training; however, the total numbers trained are very low and the engineering profession represents the primary discipline receiving the training. Representatives of local

government are the external group most frequently trained.

- Composition of the multi-disciplinary team is most often determined by the context of the project.
- The decision to use multi-disciplinary teams is based primarily on the size of the project and the expected level of public controversy.

When considering the integration of public involvement into multi-disciplinary teams the following practices were reported as part of the survey:

- The survey suggests community perspectives are represented most often by a summary of public comments and from local government input. In addition, the majority of state DOTs use public comments presented by DOT staff to the multi-disciplinary team as the specific approach to ensuring that public interests and needs are considered by the team during the decision-making process.
- The process for selection of community representation is predominantly through state DOT management selection and local government input.
- Only half of the responding states use a well-defined process that clearly specifies roles and responsibilities, set time limits, review periods, and critical milestones for multi-disciplinary teams.
- State DOTs rely on open forum meetings, websites, and newsletters as the primary methods to convey information between the general public and multi-disciplinary teams.

When evaluating the multi-disciplinary teams and the decision-making process, the following state DOT practices were revealed as part of the survey results:

- State DOTs are using multi-disciplinary teams for large projects and they are formed at the purpose and need and the scoping stages of project development.
- Few states are using a process to gauge the satisfaction of the multi-disciplinary team members during project development, with post-project critiques reported as the most common method.
- State DOTs are using metropolitan planning organization or regional planning organization representatives as the primary link between long-range planning and the project development process.

- State DOTs believe that CSS multi-disciplinary teams generally have a positive effect on the outcome of the project; specifically, greater public acceptance and expedited project delivery.

The information from the survey was helpful in gauging the general perception of state DOTs concerning CSS and multi-disciplinary teams, but not that helpful with understanding the inner workings of multi-disciplinary teams. Four case studies for multi-disciplinary teams were selected that demonstrate effective practices for a range of projects including one program-wide approach. These case studies provided valuable lessons learned through notable practices that can be transferred to project development processes of other state DOTs. These notable practices include:

- Establishing a multi-disciplinary team early enough to have it involved in developing the project purpose, and needing to ensure that the project outcome will truly reflect the context.
- Convening a fully representative team, including external stakeholders and members of the community, so that project context can be fully understood and reflected in project outcomes.
- Bringing the multi-disciplinary team into the decision-making process so that the project outcomes are genuinely an asset to the community, in addition to meeting the transportation need.
- Spending the time upfront getting the right people involved in the team, but remaining flexible so that others may be added as necessary to reflect stakeholder interests and needs.
- Using robust information-sharing and information-dissemination practices that promote a sense of transparency in information exchange and decision making.

Because the survey results revealed that most state DOTs are using multi-disciplinary teams in some form (see chapter two), these guidelines drawn from the case studies can disclose areas where practice can be revised to make multi-disciplinary teams an even more effective part of achieving CSS. Taken together, the four case studies provided some basic tenets that DOTs should keep in mind when using multi-disciplinary teams:

- Gain consensus on the vision, objectives, and ground rules for the multi-disciplinary team at the outset.
- Establish a robust, on-going connection between the multi-disciplinary team and the public.
- Empower the multi-disciplinary team to provide more meaningful input by providing specialized training on technical and procedural issues.
- Demonstrate commitment to the team by responding to their input and connecting them with high-level decision makers.
- Build flexibility into the process, whether the team is operating at the programmatic or project level.

- Make continuity of the team a priority to build trust among team members and continue to address project/program contexts through project delivery and beyond.

The following questions and respective discussion provide some suggested practices and future study topics that can advance the current practice of using multi-disciplinary teams for CSS.

- How can CSS policies speak directly to the use and composition of multi-disciplinary teams?

Nineteen surveyed state DOTs reported having a CSS policy and many mention the importance of utilizing multi-disciplinary teams for CSS. However, few specify a core team of professionals that should be involved on the teams. The results of this synthesis suggest that the following disciplines be systematically engaged for project development and considered a core team:

- Transportation planners,
- Highway and traffic engineers,
- Environmental and social scientists,
- Land-use planners,
- Cultural resource managers,
- Urban designers and architects,
- Landscape architects and urban foresters,
- Construction and maintenance engineers, and
- Public involvement specialists.

This list should be expanded as needed to reflect the project context and stakeholder interests.

For states that use internal teams as their primary multi-disciplinary teams (the majority of responding states), this practice may not capture the full context of a project and may not include even the core disciplines suggested previously. These internal teams may not represent the full range of viewpoints because DOT staff does not necessarily represent all contextual elements such as community values. Post-project surveys could provide more definitive conclusions on the performance of these internal multi-disciplinary teams and the degree to which they accurately reflect the human and natural environment context, as well as the community's perspective of a good quality of life. All four of the case studies provide excellent examples of multiple disciplines representing a wide range of stakeholder issues.

- Who should be trained in CSS?

Although most state DOTs responding to the survey believe that their training is representative of a multi-disciplinary team, most individuals being trained work in the area of project development and represent the engineering, planning, and environmental science disciplines. In addition, the group outside of state DOTs most likely to receive training is local government officials and staff. Although this technically does

qualify as a multi-disciplinary team, the question remains as to whether it represents human and natural context as well as community perspectives. The Minnesota DOT represents a notable practice of including community groups other than local officials as participants in their training program. Relatively low numbers of community participants in training programs suggest that state DOTs may want to expand such training programs to include more community members.

- What process/method can be used to select participants of a multi-disciplinary team?

Most state DOTs decide who participates on a multi-disciplinary team based on the context of the project. Although this appears logical, the question of how that context is initially defined is of utmost concern when understanding if this is an appropriate method of participant selection. Further studies could examine how state DOTs define the context in the early stages of project development and how that information is used to select stakeholders and multi-disciplinary team members. Some states have adopted approaches that use context auditing tools to identify issues early. Combining a study that assesses how state DOTs define context in the early project development phases with how they use that information to select multi-disciplinary team members could provide invaluable knowledge to state DOTs desiring the most efficient and effective teams.

- How should public involvement be integrated into multi-disciplinary teams' decision making?

The role of public involvement and community participation in CSS is widely regarded as one of the most important elements in ensuring that a solution is context-sensitive. Consequently, the role of public involvement within the constructs of a multi-disciplinary team is of critical importance to the project development process and is confirmed by the state DOTs' responses related to using public controversy as a primary trigger when deciding whether or not to use such a team. This leads to the question of whether state DOTs are fully engaging members of the public in a meaningful way in the project development process. Based on the survey, public comments are the primary means by which community interests and needs are represented on multi-disciplinary teams. Furthermore, the survey results revealed that state DOTs are relying on open forum meetings, newsletters, and websites for information dissemination and collection of public comments. Although these techniques may be effective in certain communities, they do require that persons be mobile, literate, and have access to the Internet. Therefore, close examination of meaningful public involvement techniques is critical to support the CSS qualities of open, honest, early, and continuous communication. Although no strong conclusions can be made based on the results of this synthesis, this information does indicate that further study is needed to understand how state DOTs are ensuring early and continuous public and stakeholder involvement in CSS. Further

research is needed to determine the efficacy of using public comments as a primary means of representing community interest and needs on multi-disciplinary teams. In addition, research that focuses on methods that create reliable information bridges between the general public and the multi-disciplinary team is critically needed to advance CSS. All four case studies provide good examples of integrating public involvement into the work of multi-disciplinary teams.

- For what type of projects can multi-disciplinary teams be used for in the project development process?

According to the survey, state DOTs are primarily using multi-disciplinary teams for large- to medium-sized environmental studies (National Environmental Policy Act studies). No other questions in the survey or literature review information provided any substantive reasoning for the use of multi-disciplinary teams on these larger studies, with the possible exception of the decision trigger question involving public controversy. The deductive logic tying public controversy to larger projects holds that larger projects tend to affect more people and therefore have the potential to attract more controversy. However, the CSS philosophy applies to all types of projects. The responses to the survey suggest that state DOTs may not be using multi-disciplinary teams for smaller projects and perhaps may not be fully applying the principles of CSS to these projects. Unfortunately, the survey does not provide further detail in this area; therefore, further study is needed to understand the barriers to using multi-disciplinary teams for smaller projects.

- How do we know if team members are satisfied with the process?

Gauging satisfaction of multi-disciplinary team members during the project development process is critically important to improving processes. Unfortunately, many state DOTs did not respond to this question, which may imply that they are not using a performance measurement system. For the state DOTs that did respond to this question, post-project critique/ "lessons learned" discussions were the favored method of gauging satisfaction. More probing into this area is necessary to understand what types of discussions are taking place to critique team members' satisfaction. Florida is the only state that has a structured approach to evaluating its multi-disciplinary teams' performance as part of the Efficient Transportation Decision Making process. DOTs that want to improve the effectiveness of multi-disciplinary teams should consider establishing a methodology for evaluating team effectiveness and the satisfaction of team members. In the short term, such evaluations can highlight areas where the procedures of the team should be adjusted. In the long term, evaluations can uncover areas where more systemic change is needed.

- What are the benefits of multi-disciplinary team use for CSS?

The results of this synthesis show that state DOTs value multi-disciplinary teams. Greater public acceptance, expedited project delivery, and shared funding through partnerships were recognized as positive benefits of multi-disciplinary teams by the majority of state DOTs responding to the survey. Information from four case studies provides further evidence of the benefits of using multi-disciplinary teams to advance project delivery. Specifically, the Florida case study reveals tangible benefits of reduced costs and quicker project delivery.

State DOTs understand the value of using multi-disciplinary teams and are making progress with utilizing such teams. Continued use of multi-disciplinary teams for achieving more efficient and effective solutions is essential for the development of CSS. This synthesis provides useful information to move the state of the practice forward for using multi-disciplinary teams as a method to develop solutions that reflect the human and natural environment as well as communities' perspectives of a good quality of life.

ACRONYMS

ASLA	American Society of Landscape Architects	FIHS	Florida Intrastate Highway System
BNA	Bureau of National Affairs	L RTP	Long-Range Transportation Plan
CSD	Context-sensitive design	MPO	Metropolitan planning organization
CS ³	Context Sensitive and Sustainable Solutions	NEPA	National Environmental Policy Act
CSS	Context-sensitive solutions	PD&E	Project Development and Environment
EA	Environmental assessment	PMT	Project management team
EIS	Environmental impact statement	PST	Project steering team
EST	Environmental screening tool	RPO	Rural planning organization
ETAT	Environmental Technical Advisory Team	SWG	Stakeholder working group
ETDM	Efficient Transportation Decision Making	TRIS	Transportation Research and Information Service

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APPENDIX A

Peer Exchange Information on Multi-Disciplinary Teams

Context-Sensitive Solutions (CSS) in Multi-Disciplinary Teams

What are the critical success factors to assure CSS multi-disciplinary team success?

- Managing expectations and having a transparent process for shared roles and responsibilities
- Managing resources
- Commitment and focus from all participants
- Trust
- Leadership
- Clear communication internally and externally
- Education of all involved from the beginning of the process
- Success of the team can be measured by whether “speaking with one voice”
- Is your relationship better at the end, compared to where you started, in terms of trust and credibility within your team and with your stakeholders?

Do you have examples of successful CSS interdisciplinary team formation and use that you can share? What factors contributed to their success?

- Defined roles, defined timeline—clear expectations
- Inclusive representation (construction, maintenance, and operation mentioned specifically)
- Using a facilitator
- Having regular meetings
- Documentation of the entire process and making sure as new members come on the team they are “brought up to speed” to avoid revisiting decisions already made.

What are the challenges to internal multi-disciplinary team formation? Do you have examples of innovative approaches to create and support these teams?

Summary points primarily focused on challenges:

- Resources—primarily staff time
- Training
- Lack of respect for other disciplines
- Boredom or perception of irrelevance to my discipline
- Dealing with people who do not want to change—making sure it gets institutionalized
- Direction from management.

Suggested approaches to support internal teams?

- Project management training and implementation
- Making sure not one discipline leading the process
- Using newer technologies to support team
- Reporting progress
- Awards and kudos.

What are the challenges to external multi-disciplinary team formation? Do you have examples of innovative approaches to create and support these teams?

Challenges:

- Expectations from the public as far as participation
- Unclear roles and responsibilities
- Getting right people involved depending on the size of the project
- Staff turnover.

Suggested approaches:

- Use formal memorandum of understanding to set clear roles and expectations
- Empowering the community as a part of the team
- Use celebrations at key points and at the end
- Use local staff rather than politicians as team members
- Fund positions.

What teaming skills do you think are critical to successful CSS implementation?

- Listening
- Flexibility
- Strong facilitation
- Communication
- Respect
- People skills
- Team leadership
- Conflict resolution
- Openness
- Integrity
- Creativity
- Specific transportation discipline skills.

What strategies can help assure coordination and communication among multi-disciplinary team members and/or related multi-disciplinary teams (internal/external, technical/policy, separate but related projects)?

Communication challenges are key—dealing with:

- Logistics
- Potential geographic separation
- Changing players or representatives.

Strategies:

- Liaisons across multiple teams
- Technology to support communication (intranet website, project website that is password protected)
- Documenting process and being very transparent with what you can and cannot do from the beginning
- Documenting not just the decision but why the decision was made
- Using project managers and clearly defining project manager’s role.

APPENDIX B

Survey Instrument and Accompanying Materials

TRANSPORTATION RESEARCH BOARD MEMORANDUM

March 24, 2006

TO: State Transportation Agencies' Staff

FROM: Donna L. Vlasak, Senior Program Officer
National Cooperative Highway Research Program (NCHRP) Syntheses

SUBJECT: Questionnaire for NCHRP Synthesis Topic 37-01, *Multi-Disciplinary Teams for Context Sensitive Solutions*

TRB is preparing a Synthesis of Current Practice on the subject topic. This is being done as part of NCHRP, which is sponsored by AASHTO in cooperation with FHWA. The objective of a Synthesis is to provide an overview of transportation agency practices, recent literature findings, and research in progress addressing the subject topic.

Leigh Blackmon Lane (Principal Investigator) and Teresa Townsend, Center for Transportation and the Environment at North Carolina State University, along with project team members James Bednar, CH2MHill and Allen Ibaugh, Data Transfer Solutions, are preparing this synthesis report under contract to TRB. The goal is to document the current practice in activities conducted by state departments of transportation (DOTs). This synthesis effort will produce a report that promises to help document the practices being used by state DOTs, as well as other agencies.

In order for the Synthesis to reflect the best current technology, the latest experience, and the most complete perspective, it is important that responses be requested from all state transportation agencies. Therefore, the enclosed questionnaire link is being sent to you for your agency input. We ask that you please complete the questionnaire or direct it to the appropriate personnel responsible for this type of recordkeeping, and, if possible, then please coordinate the collection and return of any separate materials so that a complete response may be obtained.

The survey is web based and will take approximately 20 minutes to complete. Here is the link that you need to fill out the survey: <http://nchrp.edats.com/>

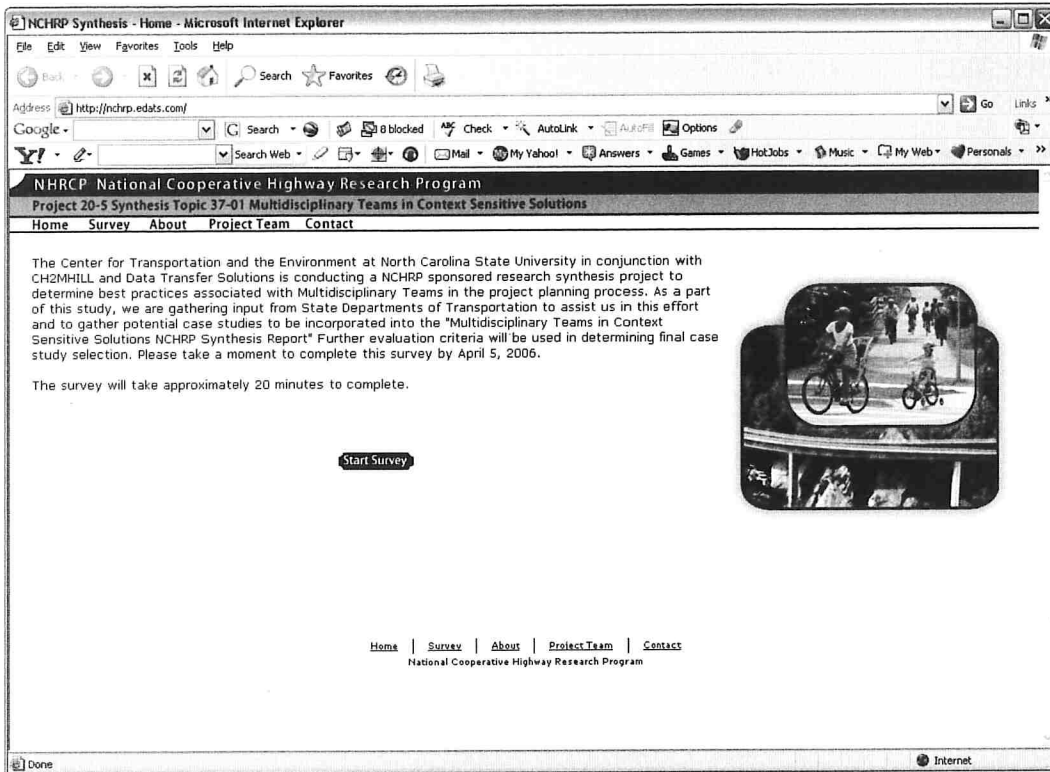
Your efforts to complete the questionnaire as accurately and completely as possible are appreciated, since the responses may be published, along with those of other agencies in order to reflect the current range of practice. We believe that the final product will be of considerable interest and use to all transportation agencies.

Please complete the questionnaire by April 5, 2006. If you need additional information, more time, or assistance in completing the questionnaire, please contact Leigh (lblane@ncsu.edu, 919-515-8041) or Teresa (tltownse@ncsu.edu, 919-515-9351).

Thank you for your timely response

Online Web Survey

Home page



Interior WebPage

The screenshot shows the interior page of the NCHRP National Cooperative Highway Research Program Survey. The browser window is titled "National Cooperative Highway Research Program Survey - Microsoft Internet Explorer". The address bar shows "http://nchrp.edats.com/survey/index.pl". The page features a navigation menu with links: Home, Survey, About, Project Team, and Contact. The main content area is titled "National Cooperative Highway Research Program Survey". Below the title is a paragraph: "Please take a few moments to complete this survey (20 minutes or less) or forward to the appropriate person in your organization to complete by April 5, 2006. Thank you for your participation!". Below this paragraph is a list of seven numbered items, each followed by a text input field:

1. Agency/Organization Reporting:
2. Name of Respondent
3. Title
4. Mailing Address
5. City
6. State
7. Zipcode

The bottom of the page shows the browser's taskbar with several open applications, including "Enterprise Reporter", "Report 4-15-2006(1)...", "Planning SurveyS...", "opt_textLib", "NCHRP- CSS Synthe...", "PW: NCHRP Consult...", and "National Cooperat...". The system clock shows "12:01 PM".

National Cooperative Highway Research Program Survey

Please take a few moments to complete this survey (20 minutes or less) or forward to the appropriate person in your organization to complete by April 5, 2006. Thank you for your participation!

1. Agency/Organization Reporting: _____
2. Name of Respondent: _____
3. Title: _____
4. Mailing Address: _____
5. City: _____
6. State: _____
7. Zip Code: _____
8. Telephone: _____
9. e-mail: _____
10. Which of the following CSS policies/directives/initiatives does your agency/organization have in place? (Check all that apply.)
 - ☐ CSS state legislation
 - ☐ Adopted CSS DOT policy
 - ☐ CSS guidance
 - ☐ Adopted aesthetic policy
 - ☐ Environmental stewardship policy
 - ☐ Design manual that includes a CSS policy statement
 - ☐ Streamlining policy
 - ☐ Not applicable/none
11. Which of the following CSS applications/practices does your agency/organization employ?
 - ☐ Incorporate CSS into local transportation planning
 - ☐ Consultation with environmental resources agencies
 - ☐ Community visioning (i.e., consensus building, charettes, comprehensive planes, long-range planning, etc.)
 - ☐ Innovative public involvement techniques
 - ☐ Multi-disciplinary team participation
 - ☐ CSS work/task groups
 - ☐ CSS training
 - ☐ Funding/community partnerships
 - ☐ Not applicable/none
 - ☐ Other

12. Does your agency/organization receive CSS training?
Yes _____ No _____
13. Who provides CSS training for your agency/organization?
_____ DOT/state
_____ NHI course
_____ University
_____ Private consultant
_____ Not-for-profit organizations
_____ Not available
_____ Other
14. How many people have been trained in your state?
_____ 0–50
_____ 51–100
_____ 101–500
_____ Over 500
15. Which of the following CSS applications/practices does your agency/organization employ?
_____ Long-range planning staff
_____ Programming staff
_____ Environmental staff
_____ Design staff
_____ Right-of-way staff
_____ Operations and maintenance staff
_____ Not available—agency/organization does not provide CSS training at this time
_____ Other
16. Which of the following disciplines in your organization receive CSS training?
_____ Transportation planners
_____ Transportation modelers
_____ Environmental scientists (biologists, ecologists, etc.)
_____ Archaeologists
_____ Historical architects/historians
_____ Landscape architects
_____ Geologists
_____ Land acquisition specialist (right-of-way agents)
_____ Community planners
_____ Social scientists
_____ Economists
_____ Accountants
_____ Engineers (roadway, geotech, structures, traffic/operations)
_____ Construction professionals (engineers and inspectors)
_____ Maintenance professionals (engineers and technicians)
_____ Other
17. Which of the following groups/individuals receive CSS training through your agency/organization?
_____ Local government officials/staff
_____ Metropolitan planning organizations (MPOs)/rural planning organizations (RPOs)

- ☐ Federal agencies
 - ☐ Environmental resource/regulatory agency
 - ☐ Key community leaders/liaisons
 - ☐ Environmental advocacy/interest groups (i.e., Sierra Club, Natural Resource Defense Fund, etc.)
 - ☐ Community organizations/neighborhood groups
 - ☐ Citizen action committee
 - ☐ Not available—agency/organization does not provide CSS training at this time
 - ☐ Other
18. Is the CSS training representative of a multi-disciplinary team?
 Yes ☐ No ☐
☐ Not available—agency/organization does not provide CSS training at this time
19. Does your agency/organization use a multi-disciplinary team in your project development process?
 Yes ☐ No ☐
20. How are multi-disciplinary teams primarily structured in your agency/organization?
☐ DOT team
☐ Formalized internal/external team charter (outside organizations/agencies only)
☐ CSS policy requirements
☐ Other
21. How are participants selected for inclusion on a multi-disciplinary team?
☐ Local government input
☐ Resource agency input
☐ MPO/RPO input
☐ Upper management decision
☐ Context driver (project specific)
☐ Standard DOT procedure/policy
☐ Not available
☐ Other
22. How does your agency/organization decide to use a multi-disciplinary team?
☐ Public controversy
☐ Natural resource issues
☐ Feasibility study
☐ Corridor study
☐ Level of NEPA documentation
☐ Urban vs. rural
☐ Size of project
☐ Multi-disciplinary teams are used on all projects
☐ Standard policy/procedure
☐ Other
23. What groups or organizations have ever been asked to participate on a CSS-based multi-disciplinary team?
☐ Local
☐ State
☐ Federal

- ☐ Key community leaders/liaisons
- ☐ Community organizations
- ☐ Neighborhood groups
- ☐ Citizen action committee
- ☐ Other public entities
- ☐ Local businesses
- ☐ Individuals
- ☐ Others

24. Briefly list some of the multi-disciplinary teams used in your organization (i.e., merger team, ETAP, etc.)

25. How are community perspectives represented on the multi-disciplinary team?

- ☐ Local elected official input
- ☐ DOT project manager represents community concerns
- ☐ MPO/RPO input
- ☐ Community leader/liaison
- ☐ Summary of public comments from public meeting

26. What process is used to select a community leader/liaison to sit on a multi-disciplinary team?

- ☐ Local government input
- ☐ Key community leader surveys
- ☐ General application process
- ☐ DOT management selection
- ☐ State elected officials selection

27. What type of rules governs the multi-disciplinary team process?

- ☐ Team charter (defined roles and responsibilities)
- ☐ DOT policy (time limits, review periods, critical milestones)
- ☐ Dispute resolution process
- ☐ Use of natural facilities for meetings

28. What specific mechanisms/approaches/techniques ensure that general public interests and needs are considered as part of the multi-disciplinary team decision-making process?

- ☐ Structured feedback meetings prescribed between the community leader/liaison and the community at large
- ☐ Public comments presented by DOT staff to multi-disciplinary team
- ☐ Records of multi-disciplinary teams meeting results disseminated to the general public via a website, e-mail, and/or mailings to citizens

29. How is information and decisions from the multi-disciplinary team disseminated to the general public?

- ☐ Websites
- ☐ Open forum meetings
- ☐ Newsletters
- ☐ Small group meetings
- ☐ Newspaper articles

- ☐ Radio programs
 - ☐ TV programs
 - ☐ Multi-disciplinary team meetings open to the public
 - ☐ Telephone calls
 - ☐ Mailing list
 - ☐ GIS online web applications
 - ☐ Public postings (i.e., post office, supermarket, billboards, public buses, etc.)
30. Are you using multi-disciplinary teams as part of the project development process?
Yes ☐ No ☐
31. For what type of projects are multi-disciplinary teams used?
- ☐ Small (categorical exclusion)
 - ☐ Medium (environmental assessment)
 - ☐ Large (environmental impact statement)
 - ☐ Feasibility studies
 - ☐ Corridor studies
 - ☐ All projects
 - ☐ Not available
 - ☐ Other
32. When does a multi-disciplinary team form in the project development process?
- ☐ Prior to purpose and need (long-range planning process integration)
 - ☐ Scoping process
 - ☐ Selection of range of alternatives to be studied in detail
 - ☐ Selection of a preferred alternative
 - ☐ Other
33. How are multi-disciplinary teams linked between the long-range transportation process and the project development process?
- ☐ Advisory committee participants are consulted during project development
 - ☐ Mailing lists are used from the long-range transportation process
 - ☐ Transportation planner becomes a member of the multi-disciplinary team
 - ☐ Project reports/documents used from long-range transportation process
 - ☐ MPOs/RPOs representation on the multi-disciplinary teams
34. What type of process is used to gauge the satisfaction of the multi-disciplinary team members experience during the project development processes?
- ☐ Surveys
 - ☐ Post critique/lessons learned discussions about multi-disciplinary team's performance
 - ☐ Other
35. How have multi-disciplinary teams affected the project development process?
- ☐ Greater public acceptance
 - ☐ Expedited project delivery
 - ☐ Delayed project delivery
 - ☐ Shared funding through partnerships
 - ☐ No change
 - ☐ Unable to determine
 - ☐ Other

36. Does your agency/organization have a case study that represents a project using multi-disciplinary teams to CSS?

Yes _____ No _____

37. Project number or project name: _____

38. Location: _____

39. Description of the project: _____

40. Project contact name: _____

41. Contact title: _____

42. Contact e-mail: _____

43. Contact phone number (no spaces or dashes): _____

APPENDIX C

Tabulated Survey Results

10. Which of the following CSS policies/directives/initiatives does your agency/organization have in place?

State DOT	CSS State Legislation (18.75%)	Adopted CSS DOT Policy (59.38%)	CSS Guidance (46.88%)	Adopted Aesthetic Policy(18.75%)	Environmental Stewardship Policy (31.25%)	Design Manual that includes a CSS Policy Statement (31.25%)	Streamlining Policy (18.75%)	Not Applicable/None (15.63%)
Alabama								x
North Carolina			x		x			
Virginia		x						
Oregon	x	x	x	x	x	x	x	
Arkansas					x			
Idaho		x	x					
Michigan		x		x				
North Dakota								x
Hawaii	x							
Texas	x		x		x	x	x	
Tennessee			x					
Washington State	x	x	x	x	x	x	x	
Montana		x	x					
Wyoming		x						
Rhode Island		x						
Oklahoma								x
Illinois	x	x	x			x		
New Hampshire								x
Minnesota		x	x	x		x		
Colorado		x			x			
California		x	x			x		
Iowa							x	
Vermont	x	x			x	x		
Utah		x	x		x	x		
Indiana		x						
Missouri								x
Maryland		x	x		x		x	
Nevada			x	x				
Nebraska			x					
Massachusetts		x	x	x		x		
Florida		x			x	x	x	
Mississippi		x						
Totals	6	19	15	6	10	10	6	5

11. Which of the following CSS applications/practices does your agency/organization employ?

State DOT	Incorporate CSS into Local Transportation Planning (37.5%)	Consultation with Environmental Resource Agencies (87.5%)	Community Visioning (ie: Consensus Building, Charettes, Comprehensive Plans, Long range planning, etc.) (65.63%)	Innovative Public Involvement Techniques (65.63%)	Multidisciplinary Team Participation (90.63%)	CSS Work/Task Groups (53.13%)	CSS Training (78.13%)	Funding/Community Partnerships (56.25%)	Not Applicable/None (0.00%)	Other (15.63%)	Other (Description)
Alabama		x	x		x		x	x			
North Carolina	x	x	x		x	x	x	x			
Virginia	x	x	x	x	x	x	x	x			
Oregon		x	x	x	x	x	x				
Arkansas		x		x	x						
Idaho		x	x		x	x	x				
Michigan		x		x	x	x	x	x			
North Dakota										x	*getting started on CSS*
Hawaii		x									
Texas	x	x	x	x	x	x	x				
Tennessee		x	x	x	x	x	x	x			
Washington State	x	x	x	x	x	x	x	x			
Montana	x	x	x		x			x			
Wyoming	x	x	x	x	x		x	x			
Rhode Island	x	x		x	x		x	x			
Oklahoma		x			x	x	x			x	FHWA
Illinois		x		x	x		x				
New Hampshire		x	x	x	x	x	x				
Minnesota	x	x	x	x	x	x	x	x			
Colorado		x	x	x							
California		x		x	x	x	x	x			
Iowa		x			x		x	x			
Vermont	x	x	x	x	x			x			
Utah	x	x	x	x	x	x	x	x		x	university education, elementary school
Indiana		x	x		x	x	x				
Missouri		x	x	x	x					x	Varies from project to project.
Maryland			x	x	x	x	x	x			
Nevada		x	x	x	x	x	x	x		x	Only on a few projects
Nebraska					x		x				
Massachusetts	x				x	x	x	x			
Florida	x	x	x	x	x		x	x			
Mississippi		x	x	x	x		x				
Totals		12	28	21	21	29	17	25	18	0	5

12. Does your agency/organization receive CSS training?

State DOT	Yes	No
Alabama	x	
North Carolina	x	
Virginia	x	
Oregon	x	
Arkansas	x	
Idaho	x	
Michigan	x	
North Dakota	x	
Hawaii		x
Texas	x	
Tennessee	x	
Washington State	x	
Montana	x	
Wyoming	x	
Rhode Island	x	
Oklahoma	x	
Illinois	x	
New Hampshire	x	
Minnesota	x	
Colorado	x	
California	x	
Iowa	x	
Vermont		x
Utah	x	
Indiana	x	
Missouri		x
Maryland	x	
Nevada	x	
Nebraska	x	
Massachusetts	x	
Florida	x	
Mississippi	x	
Totals	29	3

13. Who provides CSS training for your agency/organization?

State DOT	Dot/State (46.88%)	NHI course (46.88%)	University (18.75%)	Private Consultant (28.13%)	Not-for- profit Organiza- tions (3.13%)	N/A (6.25%)	Other (21.88%)	Other Description
Alabama			x					
North Carolina	x		x					
Virginia							x	FHWA
Oregon	x	x		x				
Arkansas		x		x				
Idaho		x						
Michigan		x		x				
North Dakota		x						
Hawaii						x		
Texas							x	FHWA
Tennessee	x	x	x	x				
Washington State	x							
Montana	x						x	Some FHWA
Wyoming		x	x	x				
Rhode Island	x	x						
Oklahoma	x						x	FHWA
Illinois							x	Training will begin in July 2006
New Hampshire				x				
				x				
Minnesota	x		x				x	Our training curriculums and teams combine the boxes checked under DOT leadership
Colorado	x	x		x				
California	x	x	x					
Iowa		x						
Vermont								
Utah	x							
Indiana	x	x						
Missouri						x		
Maryland	x							
Nevada		x					x	Two courses in last 5 yrs.
Nebraska		x						
Massachusetts	x	x						
Florida				x	x			
Mississippi	x							
Totals	15	15	6	9	1	2	7	

14. How many people have been trained in your state?

State DOT	0-50 (33.33%)	51-100 (16.67%)	101-500 (33.33%)	Over 500 (16.67%)
Alabama	x			
North Carolina				x
Virginia			x	
Oregon			x	
Arkansas	x			
Idaho		x		
Michigan				x
North Dakota	x			
Hawaii	x			
Texas			x	
Tennessee		x		
Washington State			x	
Montana			x	
Wyoming		x		
Rhode Island		x		
Oklahoma		x		
Illinois	x			
New Hampshire			x	
Minnesota				x
Colorado				
California			x	
Iowa	x			
Vermont				
Utah			x	
Indiana			x	
Missouri	x			
Maryland				x
Nevada	x			
Nebraska	x			
Massachusetts			x	
Florida				x
Mississippi	x			
Totals	10	5	10	5

17. Which of the following groups/individuals receive CSS training through your agency/organization?

State DOT	Local Government Officials/Staff (46.88%)	Metropolitan Planning Organizations (MPOs)/Rural Planning Organizations (RPOs) (34.38%)	Federal Agencies (31.25%)	Environmental Resource/Regulatory Agency (25%)	Key Community Leaders/Liaisons (21.88%)	Environmental Advocacy/Interest Groups (ie: Sierra Club, Natural Resource Defense Fund, etc.) (25%)	Community Organizations/Neighborhood Groups (21.88%)	Citizen Action Committee (9.38%)	N/A - Agency/ Organization does not provide CSS Training at this time. (37.5%)	Other (12.5%)	Other Description
Alabama									x		
North Carolina	x	x	x	x		x				x	Private Engineering Firms (consultants)
Virginia									x		
Oregon	x			x							
Arkansas									x		
Idaho									x		
Michigan		x				x					
North Dakota	x										
Hawaii									x		
Texas									x		
Tennessee	x		x		x	x	x				
Washington State	x	x	x	x	x		x				
Montana	x	x					x				
Wyoming											
Rhode Island									x		
Oklahoma									x		
Illinois	x									x	We will first train internally and for local officials and staff. We may then expand our training externally.
New Hampshire	x	x	x	x	x	x	x	x			
Minnesota	x	x	x	x	x	x	x	x		x	We try to recruit this broad level of representation and participation into all of our multi-day CSS training workshops by limiting the amount of Mn/DOT participants (60%/40% mix)
Colorado									x		
California	x	x	x								
Iowa									x		
Vermont											
Utah	x	x	x	x	x	x	x				
Indiana	x	x	x								
Missouri									x		
Maryland	x										
Nevada									x		
Nebraska										x	"consultant engineers"
Massachusetts	x	x			x	x					
Florida	x	x	x	x	x	x	x				
Mississippi			x	x				x			
Totals	15	11	10	8	7	8	7	3	12	4	

18. Is the CSS training representative of a multidisciplinary team?

State DOT	Yes (70%)	No (6.67%)	N/A - Agency/Organization does not provide CSS training at this time (23.33%)
Alabama			x
North Carolina	x		
Virginia			x
Oregon	x		
Arkansas	x		
Idaho	x		
Michigan	x		
North Dakota		x	
Hawaii			x
Texas	x		
Tennessee	x		
Washington State	x		
Montana			x
Wyoming	x		
Rhode Island	x		
Oklahoma	x		
Illinois	x		
New Hampshire	x		
Minnesota	x		
Colorado			x
California	x		
Iowa			
Vermont			
Utah	x		
Indiana	x		
Missouri			x
Maryland	x		
Nevada			x
Nebraska		x	
Massachusetts	x		
Florida	x		
Mississippi	x		
Totals	21	2	7

19. Does your agency/organization use a multi-disciplinary team in your project planning process?

State DOT	Yes (96.88%)	No (3.13%)
Alabama	x	
North Carolina	x	
Virginia	x	
Oregon	x	
Arkansas	x	
Idaho	x	
Michigan	x	
North Dakota	x	
Hawaii	x	x
Texas	x	
Tennessee	x	
Washington State	x	
Montana	x	
Wyoming	x	
Rhode Island	x	
Oklahoma	x	
Illinois	x	
New Hampshire	x	
Minnesota	x	
Colorado	x	
California	x	
Iowa	x	
Vermont	x	
Utah	x	
Indiana	x	
Missouri	x	
Maryland	x	
Nevada	x	
Nebraska	x	
Massachusetts	x	
Florida	x	
Mississippi	x	
Totals	31	1

20. How are multidisciplinary teams primarily structured in your agency/organization?

State DOT	DOT Team (Internal) (62.5%)	Formalized Internal/External Team Charter(outside organizations/age ncies only) (25%)	Internal/External (Inclusive of Community Representatives) (56.25%)	CSS Policy requirem ents (12.5%)	Other (15.63%)	Other Description
Alabama	x					
North Carolina			x			
Virginia			x	x		
Oregon	x		x			
Arkansas	x					
Idaho			x			
Michigan	x			x		
North Dakota			x			
Hawaii	x					
Texas			x			
Tennessee	x	x	x			
Washington State			x			
Montana	x	x				
Wyoming	x		x			
Rhode Island	x		x			
Oklahoma	x					FHWA
Illinois	x			x		
New Hampshire	x		x			
						Usually based upon the specific circumstances or needs of a project identified for consideration
Minnesota	x		x		x	
Colorado						"Very Project Dependent"
California	x	x				
Iowa	x		x			
Vermont	x	x				
Utah	x	x	x	x	x	Design Build Contracts
Indiana	x					
						"Informal, based on the context of the project(s) and issues."
Missouri					x	
Maryland	x	x	x			
Nevada		x	x		x	Depends on the project
						"Informal teams that include the necessary team members for the project"
Nebraska					x	
Massachusetts	x		x			
Florida			x			
Mississippi		x				
Totals	20	8	18	4	5	

21. How are participants selected for inclusion on a multi-disciplinary team?

State DOT	Local Government Input (53.13%)	Resource Agency Input (37.5%)	Metropolitan Planning Organizations (MPOs)/Rural Planning Organizations (RPOs) Input (34.38%)	Upper Management Decision (43.75%)	Context Driven (Project Specific) (75%)	Standard DOT procedure/policy (40.63%)	N/A (6.25%)	Other (9.38%)	Other Description
Alabama						x			
North Carolina	x	x	x	x	x	x			
Virginia	x					x			
Oregon					x	x			
Arkansas							x		
Idaho	x	x	x		x				
Michigan				x	x				
North Dakota				x	x				
Hawaii					x				
Texas	x	x	x	x	x	x			
Tennessee	x	x	x	x	x				
Washington State	x	x	x	x	x	x			
Montana	x	x	x	x	x				
Wyoming					x				
Rhode Island	x				x	x			
Oklahoma				x	x	x			
Illinois					x				
New Hampshire	x					x			
									Mn/DOT District Planners and Project Managers
Minnesota	x	x	x	x	x			x	
Colorado					x				
California	x		x	x	x				
Iowa	x					x			
Vermont	x	x	x	x					
Utah	x	x	x	x	x	x			
Indiana							x		
									"Varies, depending on projects, issues and stakeholders."
Missouri								x	
Maryland	x	x			x				
									Depends on the project
Nevada				x	x			x	
Nebraska					x				
Massachusetts	x				x	x			
Florida	x	x	x	x	x	x			
Mississippi		x			x				
Totals	17	12	11	14	24	13	2	3	

22. How does your agency/organization decide to use a multidisciplinary team?

State DOT	Public controversy (53.13%)	Natural Resource Issues (43.75%)	Feasibility Study (12.5%)	Corridor Study (37.5%)	Level of NEPA documentation (40.63%)	Urban vs Rural (9.38%)	Size of Project (50%)	Multidisciplinary teams are used on all projects (25%)	Standard policy/procedure (25%)	Other (21.88%)	Other Description
Alabama										x	"NEPA EA's and EIS's"
North Carolina								x			
Virginia		x						x	x		
Oregon					x	x	x	x	x		
Arkansas	x			x							
Idaho	x	x		x	x		x				
Michigan					x		x				
North Dakota	x	x									
Hawaii									x		
Texas	x		x	x			x			x	Involvement of MPO
Tennessee	x	x		x	x		x				
Washington State								x			
Montana	x	x		x	x					x	Where Districts identify
Wyoming	x	x					x				
Rhode Island								x	x		
Oklahoma								x			
Illinois										x	"Projects are chosen by Regional Engineers based on statutory requirements and other factors."
New Hampshire	x						x				
Minnesota	x	x	x	x	x				x	x	Using multidisciplinary teams is more the norm than the exception within Mn/DOT
Colorado	x	x		x	x		x				
California	x	x		x	x		x				
Iowa									x		
Vermont	x	x			x		x				
Utah								x			
Indiana							x				
Missouri	x	x	x	x	x		x			x	Issues in addition to Natural Resource issues.
Maryland								x			
Nevada					x	x	x			x	Depends on the project
Nebraska	x	x			x	x	x				
Massachusetts	x	x	x	x					x		
Florida	x						x		x		
Mississippi	x	x		x	x		x				
Totals	17	14	4	12	13	3	16	8	8	7	

23.What groups or organizations have ever been asked to participate on a CSS based multidisciplinary team?

State DOT	Local (84.38%)	State (93.75%)	Federal (93.75%)	Key Community Leaders/Liaisons (65.63%)	Community Organizations (68.75%)	Neighborhood Groups (59.38%)	Citizen Action Committee (59.38%)	Other Public Entities (50%)	Local Businesses (53.13%)	Charter Organizations (15.63%)	Individuals (46.88%)	Others (9.38%)	Other Description
Alabama	x	x	x					x					
North Carolina	x	x	x		x	x		x					
Virginia	x	x	x		x	x	x			x			
Oregon	x	x	x	x	x	x	x	x	x		x		
Arkansas		x	x										
Idaho	x	x	x	x	x			x			x		
Michigan	x	x	x										
North Dakota	x	x	x	x	x	x	x		x				
Hawaii			x										
Texas	x	x	x	x	x	x		x					
Tennessee													
Washington State	x	x	x	x	x	x			x		x		
Montana	x	x	x		x	x	x	x	x	x	x		
Wyoming	x	x	x	x	x		x		x				
Rhode Island	x	x		x	x	x	x	x					
Oklahoma	x	x	x	x	x	x	x	x					
Illinois		x	x									x	Consultants
New Hampshire	x	x	x	x	x	x	x		x		x		
Minnesota	x	x	x	x	x	x	x	x	x	x	x		
Colorado	x	x	x		x		x		x				
California	x	x	x	x		x	x	x	x		x		
Iowa	x	x	x	x									
Vermont	x	x	x	x	x				x		x		
Utah	x	x	x	x	x	x	x	x	x	x	x	x	Environmental Groups
Indiana		x	x										
Missouri	x	x	x	x	x	x	x	x	x		x		
Maryland	x	x	x	x	x	x	x	x	x	x	x		
Nevada	x	x	x	x	x	x	x	x	x		x		
Nebraska	x	x	x	x	x		x		x		x		
Massachusetts	x	x	x	x	x	x	x	x			x	x	Fire/Police
Florida	x	x	x	x	x	x	x	x	x				
Mississippi	x	x	x	x		x	x		x		x		
Totals	27	30	30	21	22	19	19	16	17	5	15	3	

24. Briefly list some of the multidisciplinary teams used in your organization. (i.e.: Merger Team, ETAP, etc.)

State DOT	MDTs Used
Alabama	
North Carolina	"Merger Teams, Interagency Leadership Teams, Process Improvement Teams"
Virginia	"Project Policy Steering Team; Project Management Initiative"
Oregon	"Columbia River National Scenic Area Design-Dialog, Programmatic Environmental Stewardship, Oregon Transportation Investment Act Statewide Bridge Delivery Unit"
Arkansas	"Interdisciplinary Staff"
Idaho	
Michigan	"CSS Policy Development Team; specific project teams"
North Dakota	
Hawaii	
Texas	"Aesthetic review teams, Value engineering studies, Work groups for UTAP categories"
Tennessee	"Inter-agency Teams"
Washington State	"MPO's, Environmental Experts, Roadside group"
Montana	"They are project specific. Teams assembled to meet project needs."
Wyoming	
Rhode Island	"various design and construction disciplines are on project teams."
Oklahoma	"Value Engineering, Scoping, Specification book"
Illinois	"Project study group"
New Hampshire	"CATF, MPO/RPC, DOT staff including design & maintenance"
Minnesota	"CSD&S Steering Team & Technical Advisory Group, Design Advisory Committee, Statewide Transportation Planning Work Groups, SAFETEA-LU Work Team, Structural Wall Committee, Access Mgmt. & Technical Advisory Committee, Road Design Manual Review Teams, Design"
Colorado	
California	
Iowa	"Project Management Team"
Vermont	"They are usually project specific"
Utah	"We don't have names, ALL projects are done with multi-disciplinary teams (within context)"
Indiana	
Missouri	"Some project teams are multidisciplinary to assure we consider key issues in a sensitive manner."
Maryland	"downtown business partnerships, community orgs."
Nevada	"Stakeholder Working Group (SWG), Technical Advisory Committee (TAC), Project Steering Team (PST), Blue Ribbon Task Force"
Nebraska	
Massachusetts	"Citizen advisory group formed for bridge projects in Martha's Vineyard, Fall River and Haverhill, Regularly used on corridor studies"
Florida	"ETDM"
Mississippi	

25. How are community perspectives represented on the multidisciplinary team?

State DOT	Local elected official input (75%)	DOT project manager represents community concerns (34.38%)	MPO/RPO input (59.38%)	Community Leader/Liaison (62.5%)	Summary of public comments from public meeting (87.5%)
Alabama	x				x
North Carolina			x		
Virginia			x	x	x
Oregon	x		x	x	x
Arkansas		x			x
Idaho	x		x	x	x
Michigan	x	x	x	x	x
North Dakota				x	x
Hawaii		x			x
Texas	x	x	x	x	x
Tennessee	x	x	x	x	x
Washington State	x	x	x		x
Montana	x	x	x	x	x
Wyoming	x			x	x
Rhode Island	x				
Oklahoma	x		x		x
Illinois	x	x	x		x
New Hampshire				x	x
Minnesota	x		x	x	x
Colorado	x		x		
California	x		x	x	x
Iowa	x	x	x		x
Vermont	x		x	x	x
Utah	x			x	x
Indiana				x	x
Missouri	x		x	x	x
Maryland	x			x	x
Nevada	x		x	x	x
Nebraska	x			x	x
Massachusetts					
Florida	x	x	x	x	x
Mississippi	x	x			x
Totals	24	11	19	20	28

26.What process is used to select a community leader/liaison to sit on a multidisciplinary team?

State DOT	Local government input (75%)	Key community leader surveys (18.75%)	General application process(6.25%)	DOT Management selection (62.5%)	State Elected Officials selection (25%)
Alabama					
North Carolina	x				
Virginia			x		
Oregon	x			x	
Arkansas					
Idaho	x			x	
Michigan	x	x			
North Dakota	x			x	
Hawaii				x	
Texas	x			x	
Tennessee	x	x		x	x
Washington State	x	x		x	x
Montana	x			x	x
Wyoming	x				
Rhode Island	x				
Oklahoma	x			x	x
Illinois					
New Hampshire	x				
Minnesota	x	x		x	x
Colorado	x	x		x	
California				x	
Iowa	x			x	
Vermont	x				
Utah	x	x		x	x
Indiana	x			x	
Missouri	x			x	
Maryland	x		x		x
Nevada	x			x	x
Nebraska	x			x	
Massachusetts	x			x	
Florida				x	
Mississippi					
Totals	24	6	2	20	8

27.What type of rules govern the multidisciplinary team process?

State DOT	Team Charter (Defined roles and responsibilities) (50%)	DOT policy (Time limits, review periods, critical milestones) (50%)	Dispute resolution process (9.38%)	Use of neutral facilitators for meetings (31.25%)
Alabama		x		
North Carolina	x	x	x	x
Virginia		x		
Oregon	x	x		
Arkansas		x		
Idaho				
Michigan	x			
North Dakota	x			x
Hawaii		x		
Texas	x			x
Tennessee	x	x		x
Washington State	x	x	x	
Montana	x			x
Wyoming	x			x
Rhode Island		x		
Oklahoma				
Illinois	x			
New Hampshire				
Minnesota	x			
Colorado				
California		x		x
Iowa		x		
Vermont	x			x
Utah	x	x		x
Indiana				
Missouri				
Maryland	x			
Nevada		x		
Nebraska				
Massachusetts	x	x		
Florida	x	x	x	x
Mississippi		x		
Totals	16	16	3	10

28. What specific mechanisms/approaches/techniques ensure that general public interests and needs are considered as part of the multidisciplinary team decision-making process?

State DOT	Structured feedback meetings prescribed between the community leader/liaison and the community at large (59.38%)	Public comments presented by DOT staff to Multidisciplinary team (84.38%)	Records of Multidisciplinary teams meeting results disseminated to the general public via a website, email, and/or mailings to citizens (62.5%)
Alabama		x	
North Carolina	x	x	
Virginia	x	x	
Oregon	x	x	x
Arkansas		x	
Idaho	x	x	x
Michigan	x		
North Dakota	x	x	x
Hawaii		x	
Texas	x	x	x
Tennessee	x	x	x
Washington State	x	x	x
Montana	x	x	x
Wyoming			
Rhode Island		x	x
Oklahoma	x	x	x
Illinois			x
New Hampshire	x		x
Minnesota	x	x	x
Colorado		x	x
California		x	x
Iowa		x	
Vermont	x	x	x
Utah	x	x	x
Indiana	x	x	
Missouri		x	x
Maryland		x	x
Nevada		x	x
Nebraska	x	x	
Massachusetts	x		
Florida	x	x	x
Mississippi		x	
Totals	19	27	20

29. How is information and decisions from the multidisciplinary team disseminated to the general public?

State DOT	Websites (71.88%)	Open Forum Meetings (87.5%)	Newsletters (68.75%)	Small Group Meetings (62.5%)	Newspaper articles (62.5%)	Radio programs (21.88%)	TV programs (12.5%)	Multidisciplinary team Meetings Open to the Public (53.13%)	Telephone Calls (18.75%)	Mailing List (56.25%)	GIS online web application s (9.38%)	Public postings (i.e.: Post Office, Supermark et, Billboards, Public Buses, etc.)
Alabama		x										
North Carolina	x	x	x		x	x		x	x	x		
Virginia	x	x	x					x				
Oregon	x	x	x	x	x					x		x
Arkansas		x	x	x	x					x		x
Idaho	x	x	x	x	x			x		x		
Michigan	x	x	x	x	x							
North Dakota	x			x	x	x	x	x		x		
Hawaii		x										
Texas	x	x			x							
Tennessee	x	x	x	x	x	x		x		x		x
Washington State	x	x	x	x				x	x	x		
Montana	x	x	x	x	x			x	x	x		
Wyoming	x		x		x			x				
Rhode Island		x										
Oklahoma	x	x	x	x	x				x	x		
Illinois	x	x	x	x	x	x	x			x		x
New Hampshire	x	x	x	x	x			x		x		
Minnesota	x	x	x	x	x	x		x		x		
Colorado	x	x	x	x				x				
California		x	x	x				x				
Iowa		x										
Vermont	x		x	x	x			x			x	
Utah	x	x	x	x	x	x	x	x	x	x	x	x
Indiana												
Missouri	x	x	x	x	x	x				x		
Maryland	x	x	x	x	x			x		x		x
Nevada	x	x	x	x	x		x		x	x		
Nebraska		x			x					x		
Massachusetts		x						x				
Florida	x	x	x	x	x			x		x	x	
Mississippi	x	x										
Totals	23	28	22	20	20	7	4	17	6	18	3	6

30. Are you using multidisciplinary teams as part of the project planning process?

State DOT	Yes (87%)	No (13%)
Alabama		
North Carolina	x	
Virginia	x	
Oregon	x	
Arkansas	x	
Idaho	x	
Michigan		x
North Dakota	x	
Hawaii		x
Texas	x	
Tennessee	x	
Washington State	x	
Montana	x	
Wyoming	x	
Rhode Island	x	
Oklahoma	x	
Illinois	x	
New Hampshire	x	
Minnesota	x	
Colorado	x	
California	x	
Iowa		x
Vermont	x	
Utah	x	
Indiana		x
Missouri	x	
Maryland	x	
Nevada	x	
Nebraska	x	
Massachusetts	x	
Florida	x	
Mississippi	x	
Totals	27	4

31. For what type of projects are multidisciplinary teams used?

State DOT	Small (Categorical Exclusion) (15.63%)	Medium (Environmental Assessment)(59.38%)	Large (Environmental Impact Statement) (65.63%)	Feasibility Studies (25%)	Corridor Studies (53.13%)	All projects (25%)	N/A (0%)	Other (18.75%)	Other Description
Alabama								x	"NEPA EA's and EIS's"
North Carolina						x			
Virginia						x			
Oregon						x			
Arkansas	x	x	x		x				
Idaho			x		x				
Michigan						x			
North Dakota		x	x						
Hawaii	x	x							
Texas			x	x	x			x	Specific project issues"
Tennessee		x	x		x			x	No specific criteria
Washington State						x			
Montana	x	x	x	x	x			x	"Project specific - depends"
Wyoming			x						
Rhode Island						x			
Oklahoma		x	x	x	x				
Illinois									
New Hampshire		x	x						
Minnesota	x	x	x	x	x				
Colorado		x	x		x				
California		x	x		x				
Iowa		x	x		x				
Vermont		x	x		x				
Utah	x	x	x	x	x	x			Projects are chosen by Regional Engineers based on statutory requirements and other factors.
Indiana		x	x						
Missouri		x	x	x	x				
Maryland						x			
Nevada		x	x		x			x	Only on some projects
Nebraska		x	x					x	Generally where there is a need to work with interested parties
Massachusetts				x	x				
Florida		x	x	x	x				
Mississippi		x	x		x				
Totals	5	19	21	8	17	8	0	6	

32. When does a multidisciplinary team form in the project planning process?

State DOT	Prior to Purpose and Need (Long Range Planning Process Integration) (32.26%)	Scoping Process (35.48%)	Selection of range of alternatives to be studied in detail (12.9%)	Selection of a Preferred Alternative	Other (19.35%)	Other Description
Alabama		x				
North Carolina	x					
Virginia		x				
Oregon		x				
Arkansas			x			
Idaho		x				
Michigan	x					
North Dakota			x			
Hawaii		x				
Texas					x	All of the above
Tennessee		x				
Washington State	x					
Montana					x	"Usually early in project. Have gone back and started over. Depends on location and issues."
Wyoming			x			
Rhode Island			x			
Oklahoma		x				
Illinois	x					
New Hampshire	x					
Minnesota					x	"This is not consistent within Mn/DOT but it can happen in any of the above ... it may have more to do with the particular Mn/DOT District managers, planners, or project managers involved with the process"
Colorado					x	"Project Dependent"
California		x				
Iowa		x				
Vermont					x	"It varies depending on the project"
Utah	x					
Indiana	x					
Missouri					x	"Varies, based on the phase of development and the types of projects, their issues and community interest."
Maryland	x					
Nevada		x				
Nebraska						
Massachusetts	x					
Florida	x					
Mississippi		x				
Totals	10	11	4	0	6	

33.How are multidisciplinary teams linked between the Long Range Transportation Process and the Project Planning Process?

State DOT	Advisory Committee participants are consulted during project planning (31.25%)	Mailing list are used from the LRTP (15.63%)	Transportation Planner becomes a member of the multidisciplinary team (37.5%)	Project reports/documents used from LRTP (40.63%)	Metropolitan Planning Organizations(MPOs)/Rural Planning Organizations (RPOs) representation on the multidisciplinary team (59.38)
Alabama					
North Carolina				x	x
Virginia			x	x	x
Oregon	x		x	x	x
Arkansas			x		
Idaho				x	
Michigan		x	x	x	x
North Dakota	x				x
Hawaii					
Texas	x			x	x
Tennessee				x	x
Washington State	x		x		x
Montana	x		x		x
Wyoming					
Rhode Island				x	
Oklahoma		x		x	
Illinois			x		x
New Hampshire	x				x
Minnesota	x	x	x	x	x
Colorado		x			x
California				x	
Iowa					
Vermont			x		x
Utah	x		x		x
Indiana					
Missouri					x
Maryland	x				
Nevada				x	x
Nebraska					
Massachusetts					x
Florida	x	x	x	x	x
Mississippi			x		
Totals	10	5	12	13	19

34. What type of process is used to gauge the satisfaction of the multidisciplinary team members experience during the project planning processes?

State DOT	Surveys (12.5%)	Post critique/Lessons Learned discussions about multidisciplinary team's performance (37.5%)	Other (28.13%)	Other Description
Alabama			x	"Review and comment"
North Carolina		x		
Virginia		x		
Oregon		x		
Arkansas			x	"None"
Idaho				
Michigan		x		
North Dakota		x		
Hawaii				
Texas			x	"Discussion for future processes"
Tennessee	x	x	x	
Washington State	x	x		
Montana			x	
Wyoming				
Rhode Island			x	"N/A"
Oklahoma				
Illinois			x	
New Hampshire				
Minnesota		x	x	Our typical approach tends to be inconsistent and informal
Colorado				
California				
Iowa				
Vermont				
Utah	x	x		
Indiana				
Missouri				
Maryland	x	x		
Nevada		x		
Nebraska				
Massachusetts			x	"Level of support for final product"
Florida		x		
Mississippi				
Totals	4	12	9	

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